TYPE AMMONITES
IV

Ich bin weit entfernt zu behaupten, dass Formen nie durch verschiedene Schichten gingen, aber der Beweis kann erst geführt werden, wenn wir überhaupt gelernt haben, jeder Muschel ihr richtiges Lager anzuweisen

F. A. Quenstedt

Der Jura, 1856, p. 43

TYPE AMMONITES

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

VOL. IV

Pages 1—67 and Map A;
Plates XXIIIA, CXXXIA, CCLXVIIB—CDXXII;
One Portrait

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JAMES BUCKMAN, 1883
Professor of Geology, Botany and Rural Economy, 1847-1863, Royal Agricultural College, Cirencester. From painting by Kate Witchell, younger daughter of Edwin Witchell, F.G.S.

JAMES BUCKMAN, F.L.S., F.G.S., F.S.A. etc.
November 20, 1814—November 23, 1884

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Part XXXIV

CHELTENHAM
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Chronology

The commencement of the text of Vol. IV of Type Ammonites offers the opportunity to introduce a new scheme of Jurassic chronology. Some years ago I wrote a paper on So-called 'Jurassic' Time; Quart. Journ. Geol. Soc. LIV, 1898, p. 442. When that paper was referreed, "it was pointed out to the author that [the use of the same term, like Bathonian, for Stage and for Age] would lead to confusion; and he then proposed to use, as distinctly chronological terms for Ages, names taken from dominant Ammonite genera" (p. 442). Names were given to certain Ages from Lower Lias to Cornbrash. However, the plan seemed generally to be regarded as making undue complication: it was argued that the same faunal term was used for the subdivision of an Age—a hemera—and for the subdivision of a stage—a zone; also that the same geographical terms were used for divisions of greater magnitude —Jurassic System, Jurassic Period.

Lately, the demand that there should be a separate nomenclature for chronological as distinct from stratigraphical terms has been repeated on various occasions. It seems advisable to meet it: not because a dual system of terminology is altogether desirable, but rather with the hope that in the future the system based on zoology will supplant that based on stratal development and geography, at any rate for all those purposes where chronology and biology are concerned. Other considerations have also influenced this decision.

There are various reasons why names taken from places—geographical names—are unsuitable for chronological purposes. Chronology depends on the succession of phenomena, and when there are zoological phenomena, as in the Jurassic Period, they are more reliable as time-indices than the geological-geographical developments of strata: these are frequently defective, either through poverty in original sedimentation, or by loss from penecontemporaneous erosion. An ideal geographical naming of geological strata would be taken from the places along some stretch of coast where, owing to gentle dip, successively younger beds are met with in a given direction—for instance, from Lyme Regis (Lymian) to Portland (Portlandian) along the Dorset coast. The geological succession accords with geographical position—to remember the sequence is, therefore, easy. But this ideal is impracticable: there are not enough place-names to express the stratal (and faunal) developments, while the stratal succession, grand though it be, is too frequently incomplete—strata which are important elsewhere are either poorly developed or entirely lacking here. Therefore it has become the custom to range widely afield for names of Stages, there being in many cases several localities with about equal claims to such distinction. But this has a great disadvantage—the sequence of names given to stages becomes an arbitrary one, difficult to memorize, because there is no geographical association as an aid. With few names this difficulty was not great; but with so large an increase in the names of Stages in a Period like the Jurassic, due mainly to the discovery that local stratal developments are so frequently defective, the difficulty becomes formidable.

Local failures of strata, too, have introduced complications, for as

TABLE I—*JURASSI*

I—English Stratal Terms: (a) *Sub-divisions*	I—English Stratal Terms: (b) *Main Divisions*	II—English Stage Names, etc.
	Wealden Beds, pars	Speeton Clay, pars (Spilsby Sandstone)
Upper Purbeck Beds Middle Purbeck Beds Lower Purbeck Beds	Purbeck Beds	
absent ?		
Portland Stone ("Creamy Limestones")	Portland Beds	Portlandian
Portland Glauconitic Beds ("Rubbly Beds")		
Shotover Grit Sands		Bononian
Portland Sands		
Hartwell Clay	Kimmeridge Clay	
Upper Kimmeridge Beds		Kimmeridgian
absent ?		
Upper Kimmeridge Beds	Kimmeridge Clay	Kimmeridgian
Middle Kimmeridge Beds		
Lower Kimmeridge Beds		Sequanian

[C]HRONOLOGY

II—Continental etc. Stage Names	IV—Chronologico-Stratigraphical Terms (T.A. I—III, etc. (*Ages or Stages*)	V—Chronological Terms (T.A. IV) (*Ages*)
Aquilonian (Upper Volgian)		Craspeditan
Tithonian (pars) (Koniakau Beds, pars) (Upper Portland, Mexico, pars)		Proniceratan
absent ?	Portlandian	Gigantitan (CLVI)
		Behemothan (CCCV)
		Paravirgatitan (CCCVI)
Lower Volgian ?		Virgatitan ? (Pseudovirgatitan ?)
Portlandian Lower Tithonian		Aulacosphinctean
Lower Portland of Mexico		Mazapilitan
Lowest Tithonian		Gravesian
	Kimmeridgian	
Virgulian Pteroceran		Physodoceratan
		Rasenian
Sequanian		Prionodoceratan (CLV)

TABLE I—*JURASSIC*

Ia	Ib	II
Upper Calcareous Grit (Supra Coralline Beds)		
Coral Rag		
Coralline Oolite (Ampthill Clay)		
Middle Calcareous Grit (Lower Calc. Grit)	Oxford Oolites	Corallian
Hambleton Oolite (Lower Calc. Grit)		
Lower Calc. Grit (Yorks) (Littlemore Sands, lower part ?)		
Upper Oxford Clay		
Middle Oxford Clay	Oxford Clay	Oxfordian
Lower Oxford Clay	Kelloway Rock, pars (Yorkshire)	
absent ?		
Kellaways Rock	Kellaways Beds (Wiltshire) Kelloway Rock, pars (Yorks)	
Kellaways Clay		
		Callovian
Clay above Cornbrash		
Upper Cornbrash		

HRONOLOGY (*continued*)

III	IV	V
startian		Ringsteadian (CCXXV)
auracian		Perisphinctean (CCLXXXII)
xfordian (Argovian)	Argovian	Cardioceratan (CCXCVI)
Lower Oxfordian	Divesian	Vertumniceratan (CXVI)
		Kosmoceratan (CCLXI)
Chanasian		Reineckeian
allovian	Callovian	Proplanulitan (CCXIII)
Chanasian		Macrocephalitan (CCLXXXIV)

TABLE I—*JURASSI*

IA	IB	II	
Middle Cornbrash	Cornbrash		
Lower Cornbrash			
Hinton Sands			
	Forest Marble		
Forest Marble			
			Bradfordian
Bradford Clay		Bathian (Bathonian)	
	Bradford Clay		
Great Oolite Clay			
Upper Great Oolite (Upper Fullers' Earth Clay)			Fullonian
	Great Oolite Series (Upper Division)		
Middle Great Oolite (Upper Fullers' Earth Rock)			
Lower Great Oolite (Lower Fullers' Earth Rock)	Great Oolite Series (Lower Division)		
Stonesfield Slate			
Fullers' Earth (Lower Fullers' Earth Clay)			Fullonian
Upper Inferior Oolite		Vesulian	
Middle Inferior Oolite	Inferior Oolite	Bajocian	

CHRONOLOGY *(continued)*

III		IV	V
Bedfordin (Bedfordian)			
			Clydoniceratan
Bradfordin			
			Oxyceritan ?
Falaisin		Falaisian (Bathian)	Tulitan (CCLXVIII)
Stonesfieldin		Stonesfieldian	Gracilisphinctean (CXCIII)
Cadomin			
Ehningin		Eningenian (Vesulian)	Zigzagiceratan (CCLIX)
			Parkinsonian (CCXLVII)
Scarboroughin [Scarburgian]	Bajocian	Bajocian	Stepheoceratan (CCXXXVIII)
Maconin [Maconian]			Sonninian (CCXCVIII)

TABLE I—*JURASSIC*

IA	IB	II
Lower Inferior Oolite		Aalenian
Bridport Sands (upper part) (Dun Caan Beds)	Inferior Oolite Sands	
Yeovil Sands		
Midford Sands	Upper Lias Sands	Toarcian
Cotteswold Sands		
Upper Lias	Upper Lias Clays	
Middle Lias Marlstone	Middle Lias	Pliensbachian
		Carixian
Middle Lias Clays	Middle Lias/ Lower Lias	Charmouthian
Lower Lias Clays		
		Sinemurian
Lower Lias Limestones		
	Lower Lias	
Basal Lias		
		Hettangian
Pre-*planorbis* Beds		

CHRONOLOGY (continued)

III		IV		V
Cheltenhamin [Cheltonian]	Aalenian	Aalenian		Ludwigian (CCXLVI)
Gundershofin [Gundershofenian]				
Bollin				Canavarinan
Alfeldin	Toarcian	Yeovilian		Dumortierian (CCLXVI)
				Grammoceratan (LXXIX)
		Whitbian		Haugian (XV)
Altorfin				Hildoceratan (CXIV)
Pliensbachin				Harpoceratan (IV)
Banzin	Liasian (Pliensbachian) (Charmouthian)	Domerian		Amaltheian (I)
Mendin		Hwiccian	Charmouthian	Liparoceratan (CVIII)
Rottorfin		Wessexian		Polymorphitan (LIII)
		Raasayan		Deroceratan (XLIV)
Balingin	Sinemurian	Deiran	Sinemurian	Oxynoticeratan (VIII)
Filderin		Mercian		Asteroceratan (XXXIX)
		Lymian		Coroniceratan (CXXXI)
				Caloceratan (XVII)
Hettangin		Hettangian		?

research proceeds it is seen that certain local names given to Stages, because the strata appeared to be so well developed at the localities, are imperfect for various reasons : the strata are not in true sequence, a middle portion is partially or completely missing ; or the strata are defective at their beginning or their end. Extensions of the geographical term to meet the new discoveries, or to make the name of the Stage correspond with some definite faunal development, are often not considered to be warranted.

Further, there are complications which increase the difficulties for the memory. Owing to difference in application of a name, differences of local usage and association, the same term for a Stage is found to be applied to deposits of different dates—in England Oxfordian is used for the deposits known as Oxford Clay ; on the Continent it is employed for the later deposits—the Oxford Oolites. A similar result has obtained with the term Portlandian on the Continent : owing to confusion in Ammonite nomenclature, this term came to be used for a large part of what is known in England as Kimmeridgian.

There are various reasons why zoological names applied to Ages should be more suitable for chronological purposes, and, when once learnt, easier to remember. Chronology is marked by successive faunal developments which, there is reason to think, are world-wide—at any rate, in the case of Ammonites. The difference in Ammonite-fauna between the Mediterranean and the Mid-European provinces, which is supposed to make exact synchronization of some of their respective strata difficult or impossible, is more probably not geographical, but geological—due mainly to differences in the preservation of corresponding strata in the two provinces—in the south is preserved what the north has lost, and *vice versa*.

Faunal differences which exist in supposed isochronous strata at localities a few miles apart in the same basin cannot be ascribed to geographical situation making difference of climate. Rightly, therefore, proof is required when faunal differences in two regions are, under similar circumstances, ascribed to geographical causes. Reasonably, in the more southern regions greater abundance of species may be expected ; but a complete disagreement in species between the two regions suggests not geographical, but geological differences—the correlation is at fault, the claim that the strata are truly isochronous may be questioned. When the strata of the Mediterranean and Mid-European provinces are truly isochronous, some community of species in the two regions is to be expected. In early Jurassic (Liassic) strata such community of species in the two provinces is well enough known ; in late Jurassic (Upper Oolites) strata such community is exceptional. If geographical situation be claimed as the cause in the second case, why was it not a cause in the first ?

The names given to the different episodes of the faunal succession represent a series of natural phenomena : therefore they are not arbitrary names—they correspond to what would be the ideal in geographical naming mentioned above. They should express a definite sequence of events—a sequence which in most cases has been proved by repeated research. Therefore, a series of zoological names for Ages, expressing a sequence of zoological facts, should be much easier to remember than any series of geographical names for Stages culled haphazard, as it were. Genus A appeared earlier than genus B, which again preceded genus C—a system of naming which records these facts gives a definite clue to the memory ; the same can only be claimed for geographical names taken from a definite line in one country : it cannot be claimed for them

when they are taken, as they necessarily must be, from various countries. There is nothing to guide the memory as to whether a name taken from a place in England preceded or succeeded one taken from a place in France or in Germany.

Table I, presented in pp. 6—13, illustrates these remarks. It is to be followed by another Table setting forth the sequences of hemeræ which make up the different Ages, together with such stratal correlations as the present, admittedly very incomplete state of knowledge allows. Systematic investigation of hemeral sequence is only just beginning: it is hampered by lack of names—the practice of applying to homœomorphous species at widely different horizons a designation which may, at the best, belong perhaps rightly only to one of them, is responsible for much trouble. The others may all lack names and from such lack are difficult to record with precision. All this has to be allowed for in considering the Tables.

The history and evolution of these Tables, so far as regards the Lias and the Lower and Middle Oolites, may be found in this work: I, p. xvi, II, p. x, III, pp. 9, 10, 40, 51, and in the Author's papers, Q.J.G.S., LXVI, 1910, pp. 52–108, LXXIII, pp. 257–327; LXXVI, pp. 62–103: among these will be found references to other papers, to the work of other authors, and to the labours of many kind helpers. Dr. W. D. Lang, Dr. L. F. Spath, Dr. A. E. Trueman, Mr. J. Pringle and Mr. A. Templeman have also been carrying the work further in the Lias, and are thanked for all their kind information.

As regards the Upper Oolites, the Author is greatly indebted to the masterly works of Dr. Hans Salfeld—particularly to his Gliederung d. oberen Jura in Nordwesteuropa; N. Jahrb. 1913, Beil.-Bd. XXXVII, pp. 125–246. He also acknowledges with thanks much kind help and information from Dr. A. Morley Davies, Dr. F. L. Kitchin, Mr. J. Pringle, Mr. C. P. Chatwin, and from many others who have aided by kindly submitting specimens.

Some explanation of Table I may be given. No claim is made that all the Ages mentioned in the Table should be regarded as belonging to the Jurassic Period—some of early date may be claimed for the Triassic, and some of late date for Cretaceous—or some faunas now regarded as Cretaceous may be found to have greater affinity with Jurassic.

The heterogeneous terms—Cretaceous, Jurassic, Triassic—are unsuitable for chronology. That demands some such division as

Baculitoidic Period (Cretaceous)
Ammonitoidic Period (Jurassic)
Ceratitoidic Period (Triassic)

where Baculitoid may be taken to express not only *Baculites*, but the uncoiled or aberrantly-coiled species in general, which are so characteristic of the third Period of the Mesozoic.

Division of the Ammonitoidic Period into Epochs will be required. The family or super-family names of Ammonites seem unsuitable—too limited in the first case, too comprehensive in the second. Rather, what have to be expressed are the morphological phases of Ammonite development which are dominant at certain times, as, for instance, that towards the later part of the Jurassic (Ammonitoidic) Period planulate Ammonites are the dominant feature—successive waves of heterogenetic homœomorphs which have arrived at the planulate condition along many different lines.

Thus the following scheme may be suggested :—

Virgatal Epoch—Craspeditan-Pseudovirgatitan.
Planulatal Epoch—Aulacosphinctean-Proplanulitan.
Coronatal Epoch—Macrocephalitan-Sonninian.
Falciferal Epoch—Ludwigian-Amaltheian.
Capricornal Epoch—Liparoceratan-Deroceratan.
Arietal Epoch—Oxynoticeratan-Coroniceratan,

or to Caloceratan, if that Age be not claimed for the Ceratitoidic Period.

The Virgatal Epoch is parted from the Planulatal as the time of more or less virgatome ribbing, shown in *Pseudovirgatites* and *Virgatosphinctes* besides *Virgatites,* and suggested by inner whorls of *Paravirgatites* (Pl. CCCVI). There is reason to suppose that the giants of the Gigantitan-Behemothan Ages are descendants of virgatomes—the change is shown in *Paravirgatites.*

In regard to the columns of Table I : in column I*a* various new terms, like Upper, Middle and Lower Cornbrash have been introduced, for the sake of clearness ; but these will be justified in the hemeral sequence. In column I*b* are given the usual stratigraphical terms employed by English geologists, but these have varied greatly in their application, changing with the lithic facies. In column II are the stage-names usually found in English text-books ; column III contains some of the Continental stage-names, but their exact correlation with the Stratal terms or with the Chronological terms is not to be insisted upon : they have varied in their application according as the lithic series of different localities have influenced the views of different authors ; column IV shows the terms employed for Stages or Ages in the earlier portions of this work and in the author's papers on Jurassic Chronology ; while the last column presents the presumed sequence of the chronological terms now proposed for the Ages.

A few words on these are required. There are 43 Ages : 23 are represented in this work up to Part XXXIII by figures of the name-genus (ref. Roman large caps.), 8 by a form of the date, but not the name-genus (ref. Roman small caps.), and 12 are not yet illustrated.

The time of the Proniceratan Age is doubtful : it is here suggested as occupying the time of the non-sequence between Portland and Purbeck Beds. The species of " Perisphinctes " figured by Neumayr and Uhlig from the ironstone of Salzgitter, Hanover (Hilsbild. Palaeontogr. N.F. VII (3), 1881, pp. 135–203) may be of approximately the same date—perhaps derived, perhaps entombed in a condensed deposit.

The largest area of exposed Portland Rocks in England, if not in the world, is found in the district East Oxfordshire—West Buckinghamshire, in about the middle of which this work has been and is being-written. It is rich in Ammonites, many are large, some are giants—megalomorphs. The strata are divided into some twenty beds by the quarrymen, some of which show signs of redeposition. There are certainly quite twenty hemeræ to be dealt with, and if there be only an average of two species to each hemera, that means forty species of Ammonites for (Upper) Portlandian : more may be expected.

A summary of the strata is as follows :—

Gigantitan Age	Upper Chalky Beds (" Witchett " +).
	Sandstone (*Titanites, Briarcites*).
	Lower Chalky Beds (*Gigantites*).
Behemothan Age	Speckled Beds and Sands.
	Glauconitic Marls (*Leucopetrites*).
	Glauconitic Stone (*Behemoth, Glaucolithites*).

The apportionment between the Ages is provisional. Locally, there

are several penecontemporaneous erosions, with consequent absence of beds—non-sequences.

It is doubtful if any ammonitiferous strata of these Ages occur on the Continent, except at Boulogne, France. There the Ammonite-fauna of the Paravirgatitan Age can be recognized, but it is doubtful if anything indicates Behemothan date : the fauna of the early hemeræ of Gigantitan date may be present—in the species, "*Perisphinctes*" *gorei* and *Am. bononiensis* ; but neither of these has yet been satisfactorily matched by specimens from this district. There is nothing to correspond with the Ammonite-fauna of the later hemeræ of the Gigantitan Age, with *Titanites, Briareites,* and other giants.

Further afield there seems to be nothing to correspond with the Behemothan nor with the Gigantitan faunas. The Indian *Virgatosphinctes* looks as if it should be about of Paravirgatitan date. The Tithonian, usually dated as Portlandian, is mainly of *Aulacosphinctean* date—*Pseudovirgatites* indicating perhaps something a little later. It is possible that between the Gravesian and Behemothan Ages more Age-names will have to be introduced to form a satisfactory chronology : possibly the European strata lack much—have many great non-sequences.

There is trouble with the Virgatitan Age. Its position is in accordance with the dicta of Pavlow, Salfeld, and others, who have correlated the Hartwell Clay and, perhaps, locally, some Portland Sands with the *Virgatites* Beds (Lower Volgian) of Russia. But the peculiar virgatome ribbing of the Russian Ammonites would appear to be wholly lacking from English specimens, so their identification with Russian forms is much suspect. It would not be surprising to find that the Virgatitan Age (Lower Volgian) is of far later date—perhaps later than Gigantitan. Hence, Virgatitan Age in the Table is marked with a query and Pseudovirgatitan is suggested as possibly a more correct alternative.

Mr. J. Pringle has shown me a specimen from the oil-shales of Kimmeridge, Dorset, which he suggests is *Pseudovirgatites scruposus* (Oppel) Vetters. See also H. Salfeld, p. 208. This would correlate the oil-shale horizon of the Kimmeridgian of Dorset with one horizon of the Tithonian of Austria. No such form has been found in the Hartwell Clay ; so presumably Hartwell is of slightly different date, later.

Other names of Ages are marked with a query, to express some uncertainty about their fauna, or their position, or their value.

Like the wide geographical failure of the deposits of Gigantitan Age is the failure of part of the deposit of Zigzagiceratan Age ;—only the failure, if not so prolonged in regard to time, is remarkably pronounced at a certain date. The large Zigzagiceratids (*Z. pollubrum,* CCLIX *Z. rhabdouchus,* CCC, and other species) are only known in England at two localities in Dorset and at one in Somerset : Continental literature gives no sign of them, though the small *zigzag* forms are quite widely distributed.

Quite the opposite to this appears at first sight to be the case with deposits of the Macrocephalitan Age—*Macrocephalites* is recorded from all over the globe, apparently indicating widespread synchronous deposits, which did not suffer denudation. But all this may be an illusion. Analysis of the Macrocephalite faunas and deposits has not been carried far enough yet ; but it has been done sufficiently to show that Macrocephalite-bearing beds are anisidophorous, and so not synchronous. There is promise of some half-dozen different horizons in the deposits of the Macrocephalitan Age in England : there is a suspicion that the geographical preservation of some of these deposits is very limited in

this country, that the extension of some of them to the Continent, if it does not fail altogether, is but partial, and that their synchronization with Macrocephalite deposits further afield is quite doubtful. Strict faunal analyses will, it is to be expected, show that no area possesses the full sequence of Macrocephalitan deposits, but that what have been preserved are only odd fragments of different dates—an assortment varying from place to place.

Analyses of the deposits of the Jurassic (Ammonitoidic) Period may be expected to show similar results for the strata of all the different Ages—that is to say, that possibly no locality possesses a complete sequence, even for quite a short duration of time ; that what has been lost from any one place is considerably more than what remains ; that the tale of strata has to be built up from series of locally-preserved fragments, which are sequentially very incomplete ; and that, therefore, the task of correlating the strata is particularly difficult—all the more so because of the phenomenon of faunal repetition. It follows, too, that if there are so many gaps in the true tale of strata of any one area, the time occupied in the deposition of the strata of the Jurassic Period is far greater than what may be estimated from an area of thickest deposits. For if strata supposed to be synchronous, supposed to be the deposit made during one hemera, are found to be really fragments of sequential deposits made during several hemeræ, and can, by their overlapping in time, here and there—A followed by B at one place, B by C, A missing, at another, C by D at a third locality—be fitted, after the manner of a puzzle, into a sequence, the great increase in the number of hemeræ and of Ages follows logically as a necessity, rightly to express the chronological phenomena. Then, to obtain the time occupied in deposition, the maximum thicknesses of deposits for each hemera must be added : A may be two inches thick at one place, and 100 feet at another, B at these places may be just the reverse—the full thickness of deposit made during A, B, on which a time-estimate must be based, is, therefore, 200 feet, not 100 feet and two inches.

Even when all these data have been collected, allowance would have to be made for possible losses. The deposits of a hemera which were once laid down in great thickness may have been so denuded that only a few inches are left, or they may have been destroyed without leaving any trace. A little more denudation would have utterly destroyed all trace of the deposit made during the hemera of *Zigzagiceras pollubrum*—would have effaced all trace of it from the localities in Dorset–Somerset as effectually as it has done from all other places in England, on the Continent, and, as far as is known, from the rest of the world. It is impossible to imagine that what so nearly happened in this case has not actually happened in others—perhaps in many cases. Gaps in the faunal record may give some clue as to where such losses have occurred.

One further point : by the aid of a greatly-extended hemeral system of chronology, but only by such a system, it should be possible to map the lines of denuded areas, hemera by hemera. Then it will be seen whether these lines coincide, or whether, as is likely, they have been propagated in a wave-like manner more or less parallel to certain known lines of weakness. The possible importance of such research, with the knowledge it should give for economic questions is obvious.

The main lines of weakness in England are, north to south, two—the Malvernian axis and the Pennine ; west to east, two, the Mendip axis and the North Devon axis. South of this, and roughly parallel,

lies the Armorican axis of N. France. Movements of these west to east axes divided the English Jurassic sea at times into areas with and without autochthonous Ammonites. When and where Ammonites are not autochthonous they drifted in, into a closely land-locked area, from the autochthonous district off West Scotland; when Ammonites were presumably autochthonous all over England there was free communication both N. and S. of the island made of Ireland, Wales, Lyonesse and Brittany (**Juroceltia**), so that the sea joined up West Scotland with the southern autochthonous area—the Paris Basin.

The following appears to give the history:

Ages	*Conditions*
Gigantitan | Macrocephalitan	Autochthonous Ammonites all over England.
Clydoniceratan Oxyceritan	No autochthones in England. Great destruction of strata. Armorican or a more southern axis perhaps divides.
Tulitan	The N. Devon axis is, perhaps, the dividing line — shutting in the autochthones to the S. of it.
Gracilisphinctean | Late Zigzagiceratan	No autochthones in England. Armorican axis perhaps the dividing line.
Early Zigzagiceratan Parkinsonian	The North Devon axis divides. Autochthones were to the S. of it; but there would also seem to have been an extension of the Malvernian axis to the Dorset Coast, so that autochthones lie mainly to the west of such a line. See also remarks on distribution of "Fossil Beds" in the Author's paper, Bajocian of the Sherborne District; Q.J.G.S. XLIX, 1893, p. 507.
Stepheoceratan | Ludwigian	The Mendip axis divides in the main, but it was breached between Somerset and S. Wales, so that Dundry had autochthones like Dorset. Dundry was cut off from the non-autochthonous area of the Cotteswolds by an elevation of the Malvernian axis.
Canavarinan | Caloceratan	Autochthonous all over England.

Numbering the west-east axes from S. to N., 1, Armorican, 2, N. Devon, 3, Mendip, it will be seen that the rhythm of movement presumably is 3, 2, 1, 2, 1.

Criteria used in estimating autochthonous areas from those which

are not are, for the first, abundance of species and of specimens, good preservation, delicate mouth-appendages preserved ; for the second, rarity of species and of specimens, conch more or less broken, mouth-appendages not preserved, body-chamber lost or considerably broken, sides of cameræ more or less smashed in, test showing abrasion, covered with serpulæ or oysters.

Thus the frequency of Ammonite remains and their condition have much information to give on palæogeographical questions. At the beginning of the Ammonitoidic Period there were no Ammonites in the British area—something of Baltic Sea conditions obtained. Irruption of the sea during the Caloceratan Age brought in conditions something like the English Channel and North Sea—the island of Juroceltia lying to the north and west. During the Clydoniceratan Age there was again lack of Ammonites, for no fragment of an Ammonite from Forest Marble is yet known. The broken-up condition of testaceous remains in that deposit points to a shallow sea, much wave-action and proximity of a rocky coast. Later, there is again irruption of a larger sea, with swarms of Ammonites. Towards the close of the Ammonitoidic Period—in the Behemothan and Gigantitan Ages—there was, over Middle and Southern England, a sea very favourable to the growth of large Ammonites—perhaps warm and fairly deep. But this whole area must then have been upraised to be drained of sea, and afterwards—in the Craspeditan Age—lowered to become a large fresh-water lake—Lake Superior conditions. Marine conditions at that time appear to have existed in Yorkshire, which would, then, have to be given an outlet to the Arctic Ocean.

In those Ages, in which a west-to-east axis is mentioned as making division, the conditions would have been similar to a parting of the English Channel from the North Sea by an elevation of the Wealden Axis : the English Channel conditions, with good connection to open sea, prevailed to the south of the axis ; but the Cotteswold-North-west England area was different from the North Sea—it was a kind of Mediterranean, with a strangulated outlet of Straits-of-Gibraltar type, such straits lying between the Isle of Man, a north-east promontory of Juroceltia, and south-west Scotland, possibly at that time a western portion of the North-American Continent.

The true problem of British Jurassic palæogeographic reconstruction lies, however, in the Estuarine Beds, which occur in Yorkshire in the Ludwigian to Stepheoceratan Ages, alternating with marine beds and, in the late Zigzagiceratan Age, are found there, in the east Midlands, in east and in west Scotland. How long they persisted is uncertain : they might have been followed by marine strata of, say, Tulitan date which have been wholly destroyed in some of the areas—there is some evidence for this supposition in the east Midlands. But at any rate marine conditions were again general by Macrocephalitan date. But the problem is to find the water for the rivers to make these estuaries, for they cannot be connected up to one river only. Local British supplies would be insufficient ; but if a river be brought from Iceland way to make its estuary in Western Scotland, and the drainage of Scandinavia be invoked for the Eastern Midlands, there still remain problems of Eastern Scotland and Yorkshire. The rivers evolved should approximate to some present-day geographical types, and the estuaries must be capable of conversion into seas according to the demands of autochthonous or of drifted Ammonites for the respective areas and times concerned.

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BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

PART XXXV

20 Plates

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This mutability of lacustrine, estuarine and marine conditions presents some interesting problems. For instance, where, at the commencement of the Ammonitoidic Period, did the Jureuropean land-locked sea have connexion with the ocean? It may be suggested that it was in south-eastern Europe, and yet that the irruption which opened up the Jureuropean Sea came from the west. At any rate, two gateways for this sea were, later, developed on the west—that of Bordeaux, which was to the south of Juroceltia, and that of Ireland-Hebrides, which was to the north of it. Differences in the distribution of species of *Psiloceras* should give evidence as to whether these two gateways were breached separately or simultaneously, just as the absence from Wurtemberg of the geologically-earliest forms of *Psiloceras*—those of the *P. planorbis*-type—seems to supply one piece of evidence, not only against the irruption being from the east, but in favour of a temporary closing up of any connexion that may have formerly existed in that direction.

There is, however, another piece of evidence—the difference in the Caloceratan fauna of Wurtemberg and the North-Eastern Alps. But this raises the whole question provoked by a consideration of Table I—why is a difference of fauna considered, in the one case, to imply absence of strata without difference of province, and, in another case, difference of province without necessarily absence of strata?

The faunal differences are not of the same value. In the one case there are, say, two localities, A, B, which may be hundreds of miles apart. In the case of A the faunal (Ammonite) sequence may be represented by the letters a, c, d; but in the case of B the faunal sequence stands as a, b, c, d. In the respective faunas a, c, d, the identity of species is so great as to warrant the assumption that there was free inter-communication between the two localities. The difference between them lies in the absence of the fauna b from the locality A, but its presence in the locality B. It is, then, reasonable to assume that such absence from the locality A was due to penecontemporaneous removal of the deposit which contained fauna b—an assumption which can generally be strengthened by investigation of localities intermediate between A and B: some localities will show presence of fauna b, others not only absence of fauna b, but absence of any strata between the beds containing a and c.

In regard to two localities, B and C, which may be only a few score miles apart, the faunal difference may be expressed, in the one case, as before, a, b, c, d; but, in the other case, as a1, b1, c1, d1: the species in the faunas are not identical—the species are morphic equivalents, they are similar in general facies at each respective faunal horizon. In such case it is reasonable to assume that the respective faunas belonged to separated geographical provinces, that there was some barrier which prevented all communication between the respective areas; because, if there was any communication, there would be a mingling of a, b, c, d and a1, b1, c1, d1, since the distance is quite short; seeing that there are cases of identity of species pointing to free communication when the distance is far greater. And another piece of evidence supports the assumption of distinct provinces—that in the case of C there is greater faunal (Ammonite) richness of species than in B.

If A be taken to represent South England, B, Wurtemberg, and C, the North-Eastern Alps, then the above reasons show why Dorset and Wurtemberg may be considered to be parts of one province, while the North-Eastern Alps may be supposed to be separated from that province

during the Caloceratan Age. But, later, there is found to be identity of species between B and C and greater equality in their respective faunas, which lead to the conclusion that the barrier was ultimately broken down.

Not quite the same evidence can be brought forward in support of the argument that the Cotteswold area (**Juromercia**) was a province separated from the Dorset-Somerset area (**Jurowessexia**). In this case there is no evidence that the Ammonite faunas of the two provinces were distinct—in fact, the evidence, so far as it goes, suggests specific identity. But, south of a line which ran somewhat north of the Mendip axis, there was, during Ludwigian-Sonninian Ages, an Ammonite-fauna of remarkable richness, in excellent preservation. Just a few miles away, north of the line, the Ammonite-fauna is scanty, both in species and in specimens, all badly preserved. Direct communication seems, therefore, to be ruled out in favour of indirect communication around the island of Juroceltia, to the north of which there was a Hebridean area (**Jurhebridea**), off the west coast of Scotland, with an abundant, well-preserved Ammonite fauna comparable with that of Jurowessexia.

Several other facts, however, support this view of an isthmus (**Jurobristolia**) parting Jurowessexia and Juromercia during Ludwigian-Sonninian Ages. The Brachiopod faunas are different,—as first pointed out by J. F. Walker—the strata are quite different, thin in the former, thick in the latter with episodes of brackish water—the Freestones—and with episodes of coral reefs ; the later the strata, the further north of the isthmus is their preservation (Map in S. Buckman, Bajocian of the North Cotteswolds : the Main Hill-mass ; Quart. Journ. Geol. Soc., LXVII, 1901, Pl. VI), pointing to a gradual rising along the line of the isthmus ; while, lastly, the further north, that is, the later the deposit, the more abundant are the Ammonites. The strata of the Stepheoceratan Age should have been preserved to the north-west of Cleeve Cloud (Cheltenham), that is, over Worcestershire (see map above cited) : they presumably remained till after Mesozoic times, but were wholly destroyed later.

Taking Brachiopod faunas and strata as evidence, it seems reasonable to assume that during Ludwigian-Stepheoceratan Ages the Jurassic strata of England were laid down in three, if not four basins : the two provinces already mentioned, **Juranglia**—Lincolnshire and East England—and **Jureboracia**—Yorkshire. Juranglia shows brackish water deposits and a micromorph Brachiopod fauna almost wholly unstudied : this area may have been an upper reach—a kind of Gulf of Bothnia appendage—of Juromercia. But Jureboracia, with its rapid alternations of marine and estuarine deposits, cannot be attached to Juranglia—the marine strata demand a position to the seaward, the estuarine to the landward of Juranglia. One or other proposition could be sustained, perhaps ; but alternations of position cannot be. Therefore it appears to be necessary to cut off Jureboracia from Juranglia, giving it the relationship which the White Sea bears to the Gulf of Bothnia, and a similar outlook—to the Arctic Ocean. Many phenomena seem to fit such an assumption, but the difficulty is to find the land whose drainage would make rivers possessing the necessary estuaries, and not to postulate two rivers flowing in opposite directions each side of an anticline,—a kind of Scandinavia—**Juropenninia**, Scotland and the Pennine range, the highland which stretched down from the north, parting Jureboracia from Jurhebridea. For, though it would not be impossible

to point to such modern cases, it would be necessary, if the parallelism is to be exact, to show that the modern rivers were of the same class as the Jurassic streams—consequents and consequents must be paralleled, not subsequents with consequents.

Thus the enquiry branches out far beyond the limits of a work on Ammonites. And it is easy to see that in other directions evidence is to be sought. For, if the estuarine beds belong to different river-systems, opening into different oceans, their faunal contents should reveal such facts. But this is not a line of Ammonite enquiry.

Pause may be made here to indicate something of interest: that the nearest modern geographical parallel to the Jureuropean Sea and its bordering lands is to be found in the Arctic Ocean and surrounding continents. This is noticeable, because there America comes into nearest contact with Europe. According to Dr. Wegener's theory of drifting continents, America was in close proximity to Europe a few million years ago—a period of time less than may be supposed to have elapsed since the close of the Jurassic Period. But, if America was not far distant from Juroceltia in the Jurassic Period, faunal and stratal similarity in the American and European Jurassic deposits should be expected. On such subject the value of very detailed chronological analyses will be shown: for, if there be such similarity, it would be evidence in favour of the theory, though if there be not, it would not be fatal to it. Between the Ammonite-fauna of Jureuropea and that of the west coast of South America there is very considerable similarity—the connexion is supposed to have been made by an extension of the Jureuropean sea, Tethys, as a mediterranean between the north shore of Gondwanaland and the south shore of Atlantis. But there is little, if any, similarity between the Ammonite-faunas of Jureuropea and North America. Whether America was close to Europe or was in its present position makes no essential difference to the geography of the Jurassic—in the first place Tethys would be depicted in length as great as the present Atlantic, in the second, it would be shown as very short. Except for such difference in length, the general configuration of land and water would be similar. In width, Tethys, as an open sea lying to the west of the island of Juroceltia, may be postulated as stretching from Rockall to Madeira.

Returning now to the Arctic Ocean—this is a sea almost surrounded by land. If Davis Strait and the Greenland Sea be imagined as closed by land, then there is a geographical parallel to the Jureuropean Sea in earliest Caloceratan Age. The breaking down of these barriers—the Greenland Sea corresponding to the Biscayan gateway and Davis Strait to the Hebridean gateway—makes a geographical parallel to the Jureuropean sea—and land—conditions during the rest of the Ammonitoidic Period. The Bering-Straits outlet corresponds to the outlet in South-East Europe, which was presumably closed when the western gateways were opened. If the Arctic-Ocean area be turned through 90 degrees to the east, so that Greenland lies to the west, and Bering Straits to the east, the parallelism with Jureuropea is very close.

As regards islands, Greenland then corresponds to Juroceltia, while the various archipelagos dotted about the Arctic Ocean parallel various similar features which may be postulated for Jureuropea. Earth-movements connecting these islands or other land-areas together would make temporary faunal provinces, distinguished by faunal dissimilarity. And dependent on such crustal movements must be raising of certain

areas within the limits of erosion, whereby penecontemporaneous denudation produced, in any province, faunal dissimilarities, marked by local absences of faunas of certain hemeræ.

It may be urged that the evidence for such crustal movements would be found only in strata laid down in shallow seas. If that be so, a deep-sea deposit, like the Tithonian, should have no faunal failure ; but, if it contain a complete faunal sequence, there should be in its fauna something analogous to the faunas of the Behemothan-Gigantitan Ages of England. These faunas are very local in Northern Europe, and the phenomenon of their absence is explained by the hypothesis of penecontemporaneous erosion. Is it necessary to have another hypothesis to explain their absence from the Tithonian ?

It does not seem reasonable to suggest that crustal movements were local, and happened only where seas were shallow. It seems more justifiable to suppose that crustal movements were like the waves of the sea, continuous, widespread and of variable magnitude, able in time to raise even deep-sea formations to within reach of denuding agencies. Time is the factor for which insufficient allowance is made. A hemera, though taken as the chronological unit, must be regarded as a very lengthy stretch of time. Migration of Ammonites would be a slow process ; but, in comparison with net accumulation of deposition of strata, it would be so rapid, or the latter was so much slower, that the accumulation of deposit was insufficient to mark the point of faunal departure from the point of arrival. The rate of Ammonite migration to that of deposition was like the flight of an aeroplane to the progress of brick-laying.

Present-day phenomena of deposition or of faunal dispersal are very unsafe guides. Geological strata are made by the net result of a constant battle of addition versus subtraction, in which are seen, locally, the small, slow victories of addition, after many vicissitudes.

The same arguments apply to modern faunal irregularities—they cannot be true criteria of what the ultimate geological record in the rocks will be : they are only records of temporary local phenomena, observed during a length of time quite negligible in comparison with the length of a hemera.

Detailed hemeral sequences will illustrate the various points which have been discussed, but the difficulty in many cases is to be sure of the sequence. Where there are scattered deposits, with anisidophorous faunas, in contiguous localities of the same area, they cannot be of the same date, though they occupy the same relative positions. But there may be, to hand, little or no clue to sequence. For instance, species of Macrocephalitidæ occur in Cornbrash limestone, Kellaways Clay and Kellaways Rock. Where these are found super-imposed in one small area, the sequence of their contained species is known—so far as the three rocks are concerned ; but the sequence of species in each rock may not be known. Where these rocks occur in widely-separated areas, their sequence can be only surmised—for the supposed Kellaways Clay may be a local argillaceous contemporary of the Cornbrash, while the local Kellaways Rock, instead of being later than the Kellaways Clay elsewhere, may be earlier or synchronous. The sequence, then, of species of Macrocephalitidæ from widely-scattered localities along the Bathian-Callovian junction can only be a matter for surmise—it cannot be stated from their matrices—not till all forms have been thoroughly worked out and definite local super-positions of strata with distinct forms have been ascertained.

Another case: in the south of France, the fauna of *Perisphinctes martelli*-type is placed in the zone of *Peltoceras transversarium*; in Wurtemberg the latter zone contains little or no evidence of the *martelli* fauna; in England the strata with the *martelli*-fauna—giants like those of the South of France—show no *transversarium*. Also, in England, penecontemporaneous erosion in these strata is very pronounced, even in two sides of the same small quarry, and, as between different quarries, there is much stratal failure. Penecontemporaneous erosion might, then, account well enough for any local faunal failure. So that the question naturally arises whether that accounts for the faunal differences between the distant places cited—whether the *martelli* and *transversarium* faunas, though homotaxial, were truly isochronous. With such doubt it is an assumption without evidence to date the English strata as *transversarium*, or those of Wurtemberg as *martelli*: it seems preferable to keep the records distinct, though it may involve an assumption as to sequence. Similar stratigraphical position does not prove contemporaneity, nor does the occurrence of two faunas in one thin bed prove their isochronism: this may become impossible to maintain in the face of adverse evidence from amplified deposits elsewhere. Thick deposits, poor in species, may be more reliable chronological guides than thin deposits which are rich. But the latter, in most cases, attract the greater attention.

Such are the methods of the hemeral tables now to be given—the sequences of many hemeræ must be regarded as supposititious, because correlation of localities analyzed according to a very detailed method is particularly difficult—in the case of condensed, polyhemeral beds, whose amplified deposits are unknown, it is nearly impossible. But some local stratal and faunal sequences will be given to show the data used.

When hemeral names are bracketed together, possible synchronism is suggested, though the names are used because of peculiarities of faunal distribution. When a name is marked by an asterisk, evidence as to position in the sequence is not altogether satisfactory—a case of surmise. The phenomenon of faunal repetition makes correlation difficult, and surmise possibly erroneous.

To place the hemeral tables in sequence, it is necessary to begin with the youngest deposits: this is the wrong method of writing, having regard to development, but the only method of presentation for a page read downwards.

For the equivalents of the Craspeditan Age, Dr. Salfeld gives three zones:—

Craspedites nodiger
C. subditus
C. okensis

The fauna of the middle one only is said to be found in Yorkshire. The hemeral sequence has, presumably, been incompletely analyzed, and lies rather beyond this work; for the rest of the English deposits of Craspeditan Age are lacustrine.

Incomplete knowledge may be urged in the case of the deposits of the Proniceratan Age—the sequence is, perhaps, to be found in scattered deposits of different dates. But for the main of the rest of the Virgatal Epoch, the following hemeral sequence and stratal succession may be suggested:—

TABLE II—JURASSIC CHRONOLOGY (Hemeræ)

VIRGATAL EPOCH (pars)
(Workmen's Terms in Capitals)

Ages	*Hemeræ*	*Strata*	*Remarks*
Gigantitan			
9.	.. ..	1. UPPER WITCHETT, in 4 beds (Cadicone Gigantids)	
8.	.. ..	2. OLD OSSES ED (Shell Bed with massive Gigantids	
7.	*Titanites*	3. BUILDING STONE (a	3. Isle of Portland: Curf with shells
6.	*Briareites* ..	4. sandstone)	4. Isle of Portland: Curf without shells
5.	*Gigantites* ..	5. HARD LIME or BLUE BED	
4.	*Trophonites* ..	6. SOFT ROCK	
3.	.. ..	7. LOWER WITCHETT	
2.	.. ..	8. HARD STONE	
1.	.. ..	9. WASTE or DIRT BED	
Behemothan			
15.	.. ..	10. HARD BROWN	
14.	.. ..	11. Sands	11, (12?) Stewkley Sands
13.	.. ..	12. Sandy Marl (1 of Crendon N.W.)	
12.	.. ..	13. Shelly rubble Bed	
11.	.. ..	14. Blue shelly Bed	
10.	.. ..	15. Sand and Stone Bed	15? Littleworth Sands
9.	*gorei*	16. Speckled Bed, many brown specks ["*Am. triplicatus*" 3554]; *P.* cf. *gorei*, 3852	16, Isle of Portland: Flinty series, +, —; "*Am. triplicatus.*" (Upper Portl., Boulogne)
8.	.. ..	17. DIRT	
7.	.. ..	18. Rubbly Limestone Bed	
6.	.. ..	19. Green speckled Bed	
5.	.. ..	20. BROWN LAYER	
5.	*leucos*	21. GREEN BED (Green marl); Ammonites with white matrix	
3.	*megasthenes* ..	22. BUILDING STONE	Barley Hill (Thame) Blue Bed
2.	*glaucolithus* ..	23. (glauconitic stone)	
1.	.. ..	24. WATERSTONE	
Paravirgatitan			
8.	*lyditicus*	25. PEBBLE BED (Lydite Bed)	25. Littleworth Lydite Clay
7.	.. ..	26. Swindon Clay	
6.	*paravirgatus* ..	27. Shotover Grit Sands	27—29. Thame Sands
5.	*Am.* cf. *devillei* ..	28. ,, ,, ,,	28. Middle Portl., Boulogne.
4.	*pectinatus* ..	29. ,, ,, ,,	
3.	.. ..	30. Shotover Fine Sands	
2.	*Wheatleyites* ..	31. Wheatley Sands	31. Lower Portl., Boulogne?
1.	*Am.* cf. *pectinatus*	32. Swindon: Lower Cemetery Beds	
		33. Hartwell Clay	
		34. Crendon Clay	

Sequence I—Long Crendon, Buckinghamshire

Table II,	1—10.	Creamy Limestones, (Barrel Hill, 1—10)
	11, 12.	Sands (Barrel Hill 11, N.W. 1)
	13—18.	Rubbly Beds (N.W. 2—7)
	19—24.	Glauconitic Beds (N.W. 8—11)
	25.	Lydite Bed (N.W. 12)
		Thame Sands (N.W. 13)
		Crendon Clay

Beds 1—11 were exposed in the quarry at Barrel Hill, on the south of the village.

Beds 12—24 are exposed in pits at the north-west end of the village, in a field to the right of the road to Oakley. Bed 12 is presumed to join to Bed 11 without gap and without lap, but this requires to be proved.

Bed 25 is also exposed there, and was pierced in well-sinkings on the south side of the village.

The Thame Sands underlie the Lydite Bed, both to the north-west and to the south of the village. They are exposed in a sandpit on Barrel Hill and in various sandpits in and around Thame. They may be supposed to represent the Shotover Fine Sands, while possibly the Shotover Grit Sands appear in the top of them, locally, and somewhat altered. There are large doggers towards the top of the Thame Sands, according to Fitton (Trans. Geol. Soc. (2) IV, 1836, p. 283), showing penecontemporaneous erosion and non-sequence, as one may interpret his figures (p. 283, figs. 1, 2). I have only seen large slabs of calcareous sandstone (Thame, near Railway Station). Coming eastwards from Shotover, these Shotover Sands are only feebly represented in the western part of Wheatley Brickyard, petering out in the eastern part. Further east towards Thame, after some interval, sands, presumably Thame Sands, lie immediately beneath Gault Clay (Cf. Fitton, p. 282). At Moreton the Lydite Bed was found in this position.

Below the Thame Sands at Crendon is the Crendon Clay, shown in the now-closed brickyard at the foot of Barrel Hill. It is presumably equivalent only to the lower part of the Hartwell Clay of Hartwell.

The Building Stone, Beds 3, 4, is seen to advantage in the quarries of Haddenham parish, adjoining the road from Thame to Aylesbury. Ammonites seen at Portland, though, of course, they could only be superficially examined, suggest that this Building Stone of Buckinghamshire was deposited during two hemeræ. The Glauconitic Beds (19—24 of Table II) correspond more or less with the beds described by Fitton at Barley Hill, near Thame, Oxfordshire (loc. cit., p. 282), a pit long ago closed. But the identity of the locally-named "Barley Hill Blue Bed," Fitton's Bed 5 presumably, with the Building Stone of Long Crendon (north-west) is not proved; for *Behemoth* has not been yet found at Crendon, and *Glaucolithites* has not been discovered among old Thame specimens said to come from the Blue Bed.

The position of *Perisphinctes gorei*, Salfeld, entered as a hemeral term opposite Behemothan 9, must be considered as approximate only. There are polygyral forms of *gorei* style in several beds both above and below. Mr. E. Neaverson, F.G.S., obtained a fine collection of such forms, reasonably supposed to have come from the Bugle Pit, Hartwell: they may be from a bed not represented at Long Crendon. He points out that the matrix resembles that of the Shotover Grit Sands.

Sequence II—Oxfordshire

Correlation Table II	*Wheatley*	*Shotover Hill*
	(Sandpit and Brickyard, near Littleworth)	(Epitomised from H. B. Woodward, Geol. Oxf.; Mem. G. Surv., 1908, 51)
Bed 15 ? ..	1. Littleworth Sands: *a.* Whitish sands, with small doggers, *Cardium dissimile* *b.* Yellowish sands, without doggers *c.* Brownish sands	1. Sands with hard, ferruginous bands
16—19.. .. 20, 21.. .. 22—24.. ..	[2, 3, 4. Hidden in hill (about 15 feet unexposed) between Sandpit and top of Brickyard (?)]	2. Whitish Limestones 3. Clays, loam and greenish sands 4. Rubbly glauconitic limestone
25..	5, 6. Littleworth Lydite Clay, Strong Clay, Amm.,	5. Lydites
25..	coarsely biplicate and fine-ribbed forms	6. Blue and brown clay, with lydites and phosphates
27—31: ..	.. ..	7. Sands and 'sand-ballers.' More detailed by S. S. B.:
27.. ..	*7a.* Sand, lydites and whitish concretions. *Paravirgatites ?*	*7a.* Shotover Grit Sands, with huge, very hard doggers(quartz grains, lydite and glauconite): *Paravirgatites*, *Am.* cf. *devillei*, *Am. pectinatus* *7b.* Shotover Fine Sands
31.. ..	*7c.* Wheatley Sands, large doggers, easily broken up. **Wheatleyites** (Amm. of *Per. eastlecottensis* type)	*7c.* Sand-rock like the Wheatley Sands
Below 34 ? (Crendon Clay)	8. Mild Clay (top of clay workings)	8. Mild Clay (top of clay workings)

The Lamellibranch fauna of the Wheatley Sands seems to have considerable resemblance to that of the Hartwell Clay.

Sequence III—Swindon, Wiltshire

(Based on information kindly supplied by C. P. Chatwin, F.G.S., and J. Pringle, F.G.S., whose section is in the press, to be published in "Summary of Progress for 1921." Identification marks on specimens in the Hudleston collection are given in inverted commas. Square brackets enclose notes by S. S. B.)

Bucks-Oxon Correlation	*Swindon Strata*
	[1—3. White Beds]
[No Ammonite evidence, perhaps, for later than Hard Lime (Gigantitan, 5), if so late.]	1. Hard, white, chalky limestone. *Lucina*, *Cerithium*, etc. 2. Seam of grey marl 3. White weathering, compact limestone, with small grains of quartz 4. [Shelly Bed] Dark-grey clayey sand, with shelly layers

TYPE AMMONITES

BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

The Author

Part XXXVIII

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and a Portrait

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PART XXXVIII

And a portrait of James Buckman

CHELTENHAM
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ST. GEORGE'S HALL

Sequence III—Swindon (continued)

Bucks-Oxon Correlation	*Swindon Strata*
	[5—7, Okus Quarry Beds]
[Lower Witchett]	5. Sands with Swindon Stone (" Bb ")
[Long Crendon Speckled Bed, *gorei*]	6. Sandy limestone (" Bc ") ; Cockly Bed [" *Am. triplicatus* "]
	7. Sandy limestone. *Perisphinctes gorei*
[*lyditicus*, Pebble Bed]	8. [Upper Lydite Bed]. Lydites and derived *pallasianus* at base of Bed 7
	Unconformity [Non-sequence]
	9. Swindon Clay
	10–12. Upper Cemetery Beds
[*paravirgatus*, Shotover Grit Sand]	10. [Lower Lydite Bed]. Hard, greenish marl, with Lydite (" Cb "). [*Paravirgatites paravirgatus*]
[*devillei*, Shotover Grit Sand]	11. Sands and clays with *Exogyra bruntrutana* and *Perisphinctes* cf. *devillei*
[*pectinatus*, Shotover Grit Sand]	12. Greenish marly sandstone (" Da ") with *Am. pectinatus* [Pl. CCCLIVB, matrix of brown ironstone, quartz grains and glauconite]
[Wheatley Sand]	and *Perisphinctes eastlecottensis*
[Shotover Fine Sand ?]	13. Lower Cemetery Beds. Grey and buff sands, with doggers (" Db ").
[Hartwell Clay ?]	14. (" Portland Clay "), Hill's Brickyard Bed .
	15. Dark bluish-grey clay

Messrs. Chatwin and Pringle consider that the Swindon Clay represents the Hartwell Clay and that where they mark ' unconformity ' " nearly 250 feet of beds at Kimmeridge Bay are missing." Faunal repetition may be the explanation of the difference in our views. Correlation between localities where none of them shows a complete succession of strata, even when beds are exposed, is particularly difficult—more so, because the Ammonite fauna of these Upper Jurassic Beds of England is very many times richer than would be supposed from the few names hitherto used to denote the species. There is a superficial resemblance in many species—massive biplicates would be a description applicable to successive species from the Crendon Clay to the top of the Portland ; but systematic analysis shows that they differ considerably. Until much more progress has been made with the illustration of this rich fauna, hitherto greatly neglected under the erroneous idea that few species and few beds were concerned, many points of correlation must remain doubtful. Many non-sequences—lack of strata locally, owing to penecontemporaneous denudation—produce the result that correlation is a kind of Chinese puzzle, no one locality giving a full and true geological record.

The classic locality of Portland might have been expected to supply useful evidence as regards the record ; but there have been no modern detailed investigation of its strata and no critical naming of its Ammonites. Interesting information was given to me by Mr. Sampson, the manager of the principal quarries, that the giant Ammonites are confined to the northern half of the island—suggesting penecontemporaneous erosion towards the south,—and that, as the beds in the northern

half, which yielded the giants, are nearly worked out, there is little chance of obtaining further specimens.

. The giants, sadly weatherworn, standing outside the office, seemed from casual examination to represent the genera *Titanites, Briareites, Gigantites, Trophonites* and some forms not yet known in Buckinghamshire. Other forms, among them presumably *Galbanites*, were noted outside houses ; but no specimens comparable with the species obtained in Buckinghamshire from the Upper Witchett and the Old Osses Ed came under my observation. This suggests that in the Midlands there are preserved Portlandian (Gigantitan) strata of later date than those of Portland.

The strata known as Kimmeridge Clay, or Kimmeridgian, with their contemporaneous deposits in other countries—White Jura and Tithonian, partly—present the puzzle in another form. The English Kimmeridgian Beds, excepting the subordinate series at the top—the Hartwell Clay, which " is some 30 feet thick at Bierton, near Aylesbury, but has not yet been bottomed " (workman), appear to give, in spite of considerable local differences of thickness, a fairly uniform faunal sequence. More detailed analysis may cause this idea to be modified ; but at present the impression given is that such earth-movements as troubled the Kimmeridge Beds belonged to a series of wide-arched waves, each one raising or depressing England as a whole, but that such movements as disturbed the later beds, say, from Hartwell Clay onwards, took the form of narrow waves of local intensity, raising or depressing small areas of England.

The puzzle in the case of the Kimmeridge Beds, therefore, is not, as in the case of the Portland Beds, the difficulty of correlating the strata of one parish with another ; it is concerned with a still harder task—the comparison of English strata with those of distant localities—mainly, for instance, with Wurtemberg. Only occasionally do the Ammonite faunas of England and Wurtemberg correspond—generally there is a most marked difference between them. Two theories may be held, (1) in Kimmeridgian times England and Wurtemberg belonged to distinct zoological provinces, (2) that they belonged to the same province, but the faunal differences are the product of penecontemporaneous erosions, affecting first the one area and then the other, more or less alternately.

Against the first theory may be set the following argument :—The similarity in numbers of Ammonite species and specimens in England and Wurtemberg during most of the Ammonitoidic Period involves the conclusion that the two areas formed part of one province during such times. From the Caloceratan to early Zigzagiceratan and from Macrocephalitan to early Cardioceratan the Ammonite features are similar. From Zigzagiceratan to Macrocephalitan they are different—there is poverty in the English area, due, possibly, to insufficient salinity of the sea rather than to any definite barrier. From Cardioceratan onwards each area is about equally rich in Ammonites ; but there is a marked difference in the species. At first sight, division into two provinces seems to be the explanation ; but sudden divorce, in the Cardioceratan Age, of such a long-standing partnership should not produce such differences : they are too great. The Ammonites left each side of the barrier parting the provinces should continue their respective developments in the two areas, producing not forms which were identical, because the conditions would not be identical, but forms which were

morphic equivalents: there should be a general parallelism of species with only an occasional foreign element. Just the reverse of this, however, is the case. The differences between the species are greater than should have been developed in isochronous strata of two provinces only lately separated. Therefore the conclusion is reached that homotaxial strata of the two areas are not isochronous—the difference of species is chronological, not geographical. This is the idea of the second theory—that the Ammonite-faunal differences between England and Wurtemberg during the Kimmeridgian are due to alternating pene-contemporaneous erosions in the two areas, the preservation in Wurtemberg of strata which England has lost, and the preservation in England of strata which Wurtemberg has lost.

It is in favour of this theory that it accounts for such phenomena of faunal dissimilarities in contiguous parishes where there can be no reason for supposing difference of province; for quite small areas would be a mass of little provinces if barriers were erected for all faunal dissimilarities. The case of the Kimmeridgian strata of England and Wurtemberg differs only from that of the local Portlandian strata, to which the theory of denudation is especially applicable, by the greater distance involved; yet prior to Cardioceratan such distance was not too great for faunal similarity.

The hemeral sequence given in Table III, p. 33, is based, therefore, on the theory that great faunal dissimilarities are more likely to indicate difference of date than difference of province. Hence, homotaxial, but strongly anisidophorous strata are considered not to be synchronous. But to find the correct sequence is a difficulty. The more anisidophorous the strata, the greater the argument for their anisochronism, but the greater the difficulty of a true sequence. Therefore Table III must be regarded as an approximation—an outline scheme of dating to be utilized and amended: some of the evidence on which it is based will be given.

The advance in the number of divisions in the Kimmeridge Beds within a few years is noteworthy. In 1895 H. B. Woodward said: "There is no need in this country [England] to divide the Kimeridge Clay into more than two zones for general stratigraphical purposes, and these are intimately blended" (Jur. Rocks, V, 152; Mem. Geol. Surv.); but he parted these two zones into three sub-zones. In 1913 Dr. Salfeld (Tab. 1, pp. 128-130) made ten zones for approximately the same strata, giving only one doubtful gap in the British sequence. Now, in 1923, a chronological sequence of over forty hemeræ is proposed, with the suggestion that only a little more than half of the deposits made during these hemeræ have been preserved in Britain. The rest are supposed to have been more or less completely removed; but exposure-failure, collection-failure and (faunal) preservation-failure may have exaggerated this supposed loss of deposits.

When the possible thickness of Kimmeridgian deposits is taken into consideration, the demand for forty or more hemeræ as the length of time in which they were laid down does not seem so excessive. For instance, Choffat (Amm. Lusit.; Mém. Trav. Géol. Port. 1893) gives for his Lusitanian (about Aulacosphinctean to Cardioceratan inclusive), an approximate thickness of 5,500 feet. He divides as follows:—

3. Assise d' Abadia	about	2,400 feet
2. Calcaires de Montejunto	,,	1,500 ,,
1. Calcaires de Cabaço ..	,,	1,500 ,,

The beds of Abadia and Montejunto are approximately equivalent to

the Kimmeridgian, beginning a little earlier (about middle of Perisphinctean), but ending sooner, probably not so late as Aulacosphinctean. Their approximate thickness of 4,000 feet is a scale by which to measure the time taken to deposit the Kimmeridgian Beds. Yet this may not be the fullest thickness laid down during the Ages involved—that can only be ascertained when maxima are known for the deposits of each hemera.

Whether there are too many or even, possibly, too few hemeræ in Table III will depend very much on methods of individual work influencing individual opinion. For if fauna *a* be taken as a faunal index, and then, because fauna *b* be found with fauna *a* at a certain place, the assumption is made that fauna *b* is equally good as evidence for hemera *a*, and further, if the same honour be claimed for *c* because that is found occurring with *b*, it may happen that the assumptions of such an investigator become altogether erroneous. He thinks that he is proceeding horizontally, while all the time he is moving up an inclined plane. Such a deception may be the more easy because the lithic facies can also be moving up an inclined plane (S. Buckman, Jur. Chron. II, Q.J.G.S. LXXVIII, 414). Faunal analyses should be one method of detecting such deceptions.

Authors would greatly facilitate the collection of data necessary for faunal analyses and for proving or disproving hemeral sequences, by summarizing and especially by clearly tabulating their results. To read through pages of a paper in one's own language in search of details which could and should be collected and tabulated in one page is no light task: added to it is the risk of mistaking the author's meaning. To do the same even in a familiar foreign language is a matter of greater difficulty and greater risk. To accomplish it in the case of an unfamiliar language means the employment of an interpreter familiar not only with the language, but with its special scientific phraseology.

Properly-presented Tables ought, whatever language their author uses, to give their salient features to any reader, whatever his nationality. The greater the classical basis and the less the national basis of the language employed in the Tables, the more universal would be their appeal. Scientific jargon could be so presented that the less intelligible it were to the layman of the author's nationality, the more intelligible would it be to the scientific reader of any nationality. The world is not yet settled enough for this—the nationality instinct is still too strong; but for technical tables there is much which could be said in its favour. At any rate, whether in technical language or otherwise, tables of results should be given: they should be clear and they should be uniform. Sections or sequences should not be, in the same page, or even in the same paper, first in ascending and then in descending order. One or other order should be chosen for the paper and adhered to. My preference is for descending order, so that the printed page and the quarry-face correspond.

TABLE III — JURASSIC CHRONOLOGY (Hemeræ)

VIRGATAL and PLANULATAL EPOCHS (pars)
(Kimmeridgian)

H.S., H. Salfeld; J.P., J. Pringle; A.M.D., A. Morley Davies

Ages *Hemeræ*	*Strata*	*Some equivalents*
Pseudovirgatitan		
3. "*pallasianus*"	1. Hartwell Clay, Aylesbury, Bucks	Swindon, "Portland Sands"? Russia, *Virgatites* Beds?
2. "*lomonossovi*"	2. Crendon Clay, Bucks	
1. *scruposus*	3. Kimmeridge, Dorset, Oil Shales (J.P.)	Warren Farm, Stewkley, Bucks (A.M.D.); Ringstead 31 (H.S.); Moravia, Ignaziberg
Aulacosphinctean		
2. *Aulacosphinctes*	4. Chawley Beds, Berks	Tiddington, Oxon; Stramberg Beds; India, Chidamu Beds and Oomia group; Mexico, Portl. inf.
1. "*dorsoplanus*"	5. Shotover Nodule Bed, Oxon	Swindon, Wilts, Turner's Brickyard, upper clays (J.P.); Russia, Lower Volgian (pars)?
Mazapilitan		
2. *Mazapilites b*	6. Symon Beds, Mexico	Upper *Mazapilites* Beds, Mexico
1. *Mazapilites a*	7. Symon Beds	Lower *Mazapilites* Beds
Gravesian		
7. *irius*	8. Hen Cliff Beds, Kimmeridge, Dorset	Boulogne, Portl. c; Wurtemberg, White Jura ζ
6. *gravesiana*	9. Hen Cliff Beds	Boulogne, Portl. d
5. *steraspis*	10. Solenhofen Beds, Bavaria	Wurtemberg, W. J. ζ
4. *hybonota*	11. Solenhofen Beds	Upper Crusol Beds (H.S.)
3. *beckeri*	12. Solenhofen Beds	Upper Crusol Beds (Fontannes); Middle Crusol Beds (H.S.); Transylvania
2. *politus* (H.S.)	13. Wurtemberg, W.J. ε	Nattheim Beds (*A. politulus*, Quenstedt?)
1. *biplex siliceus* (H.S.)	14. Wurtemberg, W.J. ε	Nattheim Beds (*A. planulatus siliceus*, Quen.?); Transylvania
Physodoceratan		
11. *longispinum*	15. Weymouth, Dorset, Pudding Stones	Ringstead Bay 30; Swindon (H.S.); Tiddington, Stewkley, Ely, etc. *Aptychus*; Boulogne, Kim. a; Wurtemberg, W.J. ε; Italy, Mount

Ages	Hemeræ	Strata	Some equivalents
			Serra Beds; Upper Crusol Beds (H.S.); India, Oomia Beds
	10. *pseudomutabilis*	16. Weymouth, Pudding Stones	Ringstead 30 (pars); Swindon (H.S.); Stewkley, *eudoxus* (J. P.); Scotland, Loth (*eudoxus*); Boulogne, Kim. a; Middle Crusol Beds (H.S.); Wurtemberg, W.J.δ; Russia
	9. *ernesti*	17. Wurtemberg, W.J.δ	Switzerland, Baden Beds; Italy, Mt. Serra Beds; Middle Crusol Beds
	8. *yo*	18. Filey Beds, Yorks, *Aulacostephanus yo*? (H.S.)	Boulogne, Kim. b
	7. *contejani*	19. Wurtemberg, W.J. γ-δ	
	6. *acanthicum*	20. Boulogne, Kim. c	Switzerland; Portugal, Marnes d'Abadia; Russia; Mexico, San Pedro; India, Katrol group
	5. *balderum*	21. Wurtemberg, W.J. γ-δ	Mexico, San Pedro
	4. *agrigentinus*	22. Wurtemberg, W.J. γ	Sicily; Switzerland; Portugal, Marnes d' Abadia; Mexico, San Pedro
	3. *tenuilobatus*	23. Wurtemberg, W. J. upper γ	Switzerland, Baden Beds; Crusol; Russia; Mexico, San Pedro
	2. *orthocera*	24. Boulogne, Kim. d	
	1. *lallerianum*	25. Boulogne, Kim. e	
Rasenian			
	15. *mœschi*	26. Boulogne, Kim. f	
	14. *mutabilis*	27. Ringstead, 28 ..	Sandsfoot 24 (H.S.), Shotover (H.S.); Scotland, Ethie, (Cromarty)
	13. *desmonotus*	28. Gillingham (Dorset) upper clays (J.P.)	Ely Brickyard, lowest beds (J.P.) Kentish Borings, (J.P.); Wurtemberg, W.J. γ
	12. *polyplocus*	29. Wurtemberg W.J., lower γ	Switzerland, Baden Beds
	11. *platynota*	30. Wurtemberg W.J. β-γ	
	10. *planulum*	31. Wurtemberg, W.J., upper β	(Scotland, Kintradwell, Brora ?)
	9. *Amœboceras* (spinous)	32. Ethie Beds, Scotland	
	8. *Amœboceras* cf. *kitchini*	33. Wester Garty, Boulder Bed, with Brachiopods	Scotland, S.W. of Portgower
	7. *stephanoides*	34. Brill clays, Bucks	Gillingham, Dorset, lower clays (J.P.); Kentish

Ages	*Hemeræ*	*Strata*	*Some equivalents*
			Borings (J.P.); Scotland, Loth, Wester Garty, Kintradwell; Portugal, Couches de Montejunto
	6. *cymodoce*	35. Market Rasen Beds	Dorset, Abbotsbury Iron-ore; Ringstead 27; Scotland, Ethie, Kintradwell; Boulogne, Kim. g; Havre
	5. *uralensis*	36. Ringstead 25	Sandsfoot 22, up. p. (H.S.) Abbotsbury Iron-ore (H.S.); Scotland, Portgower, Navidale, Helmsdale; Russia
	4. *Amœboceras* cf. *cricki/ovale*	37. Loth Beds, Sutherland	Sandsfoot 22, lower part (H.S.); Kintradwell
	3. *circumplicatus*	38. Allt na Cuille, Sutherland, *Rhynchonella* sandstones	Abbotsbury Iron-ore, lower beds; Scotland, Loth Point, Loth (in clays); Wurtemberg, W.J. β
	2. *Raseniæ*	39. Allt na Cuille Cliff Beds, sandstones	
	1. *baylei*	40. Wotton Basset Beds, Wilts	Ringstead 19; Swindon (H.S.); Scotland, Allt na Cuille Cliff Beds; Port an Righ; France, Havre
Prionodoceratan			
	4. *superstes*	41. Brill Serpulite Bed, Bucks	Ickford, Bucks, Serpulite Bed; Minety, Wilts; Scotland, Port an Righ
	3. *prionodes*	42. Ickford Clays	England, Midlands, in boulder clay, derived; Swindon, Telford Road clay-pit (H.S.); Yorks, N. Ferriby, boring; Scotland, Port an Righ
	2. *dichotomum*	43. Shotover Clay, *Dichotomoceras dichotomum*, T.A. CXXXIX	Yorkshire, N. Ferriby, boring; Scotland, Port an Righ
	1. *Dichotomoceras* sp.	44. N. Ferriby, boring	
Ringsteadian			
	3. *marstonensis*	45. Sandsfoot 17 (younger than Ringstead 17, H.S.)	Marston (Swindon), iron-shot, and Wotton Basset (H.S.-Monogr.)
	2. *brandesi*	46. Ringstead 17	Wotton Basset, Swindon, Hildesheim and Wurtemberg, β (H.S.)
	1. *pseudocordatus*	47. Westbury, Wilts, Iron-ore	Osmington and Weymouth (H.S.)

Some of the evidence for Table III is given in the following sequences:

Sequence IV—England, Midlands

Bucks, Oxon, Berks, presumed sequence—some gaps due to exposure-failure. Brickyards were closed during the war, some have been abandoned and others not re-opened yet. Therefore investigation has been difficult.

Correlation	*Strata*	*Localities*
Pseudovirgatitan		
"*pallasianus*"	1. Hartwell Clay "*Olcostephanus pallasianus*"	Hartwell and Bierton, Aylesbury, Bucks, brickyards; Culham, Oxfordshire
"*lomonossovi*"	2. Crendon Clay "*Olcostephanus lomonossovi*"	Long Crendon, Bucks, foot of Barrel Hill. Hartwell, in part
scruposus ? (*Pseudovirgatites*)	3. Warren Farm Clay *Orbiculoidea latissima* (A.M.D.)	Old clay pits near Warren Farm, Stewkley, Bucks
Aulacosphinctean		
"*Aulacosphinctes*"	4. Chawley Beds "*Aulacosphinctes*" ?	Chawley, Berks, upper beds; Tiddington, Oxon, some 20 feet, crushed fine-ribbed Amm.
"*dorsoplanus*"	5. Shotover Nodule Band . . "*Perisphinctes dorsoplanus*"	Shotover, Oxford, Stone Band; Wheatley, Oxon, Big Stones; Tiddington Station, Oxon, well, about 25 feet down
Physodoceratan		
longispinum (*Physodoceras*)	6. Tiddington, Oxon, Clays; *Aptychus*	Tiddington Village, well-sinking, clay about 20 feet down; Brill Common; Stewkley, clay pits in work: all with *Aptychus*
pseudomutabilis ? (*Aulacostephanus*)	7. Wheatley Shales *Exogyra virgula*	Wheatley, Oxon, oil-shales; clays north and south of Brill Hill, Bucks; Rid's Hill, brickyard, E. of Brill, Bucks, (A.M.D. 1907)
pseudomutabilis (*Aulac. eudoxus*)	8. Stewkley Clays *Am. eudoxus* (J.P.)	Clay pits in work near Stewkley, Bucks
Rasenian		
mutabilis	9. Shotover, Oxon, clay with *Rasenia mutabilis*	Reported H. Salfeld, (Ob. Jura; N. Jahrb. Min., Beil.-Bd. XXXVII, Tab. 1.)
stephanoides	10. Rid's Hill Clays, *Rasenia stephanoides*	Rid's Hill, brickyard

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TYPE AMMONITES

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SEQUENCE IV (continued)

Correlation	*Strata*	*Localities*
baylei? (*Pictonia*)	11.* Woodside Clays, *Rhynchonella inconstans*	Rid's Hill, brickyard, (near Woodside Station); Shotover Hill, Oxon
Prionodoceratan *superstes*	12. Brill Serpulite Bed	Serpulite and Lamellibranch Bed, Rid's Hill, brickyard, *Am.* cf. *superstes*; Ickford, Bucks, excavations at new houses
Prionodoceras	13. Ickford Clays, *Prionodoceras*	Ickford, Bucks, well-sinking at new houses
dichotomum	14. *Shotover Clays	Shotover Hill, *Dichotomoceras dichotomum*, T.A., Pl. CXXXIX
Ringsteadian *pseudocordatus?* cf. Iron-ore of Westbury	15. Sandford Iron Bed "Bright red earthy layer—junction of Kim. Clay with Corallian. *Rh. inconstans*"	At Sandford [S. of Oxford] — H. B. Woodward (Jur. Rocks, V, 167), citing E. S. Cobbold

SEQUENCE V — WHEATLEY, OXFORDSHIRE

Correlation	*Strata*	*Remarks*
Paravirgatitan *Wheatleyites*	Wheatley Sands	
	(Signs of erosion and non-sequence)	
Unknown	1. MILD CLAY	1, 2. No signs of any Hartwell (Crendon) fauna seen. Nothing of that sort saved by workmen
	2. STRONG CLAY, blue	
Aulacosphinctean *Aulacosphinctes* *dorsoplanus*	3. BIG STONES. The nodule band. Many Amm., fine ribbed = *Aulacosphinctes?*, heavy ribbed, cf. *Per. dorsoplanus*	A condensed deposit. The part with fine-ribbed Amm. thickens to some 20–25 feet at Tiddington, 4 miles to the east
Physodoceratan *pseudomutabilis?*	4. SHALE, "will overheat the kiln." (Oil shales, dark shales). *Exogyra virgula*	

For the downward continuation from the base of *Exogyra virgula* beds, see Dr. A. Morley Davies, Kim. Clay, Brill; Q.J.G.S. LXIII, 1907, 29. The abundant Lamellibranch in the Serpulite Bed (Seq. IV, 12) is, he says, *Cyprina*

Sequence VI — Kimmeridge, Dorset
(Salfeld, p. 206)

Correlation	*Strata*	*Fauna*
Pseudovirgatitan		
"*pallasianus*"	1. White Septarian Band	Gruppe des *Per. pallasianus*
	2. Clay above Oil Shales	
scruposus	3. Oil Shales	[" *Pseudovirgatites scruposus* " (J.P.)]
	4. Top Ledge	
	5. Clay	
	6. Cattle Ledge	
	7. Clay	
	8. Yellow Ledge	
Gravesian		
irius *gravesiana*	9. Clay [Hen Cliff Beds]	*Gravesia irius, G. gravesi*
	10. Maple Ledge	
Physodoceratan		
longispinum *pseudomutabilis*	11. Clays [Gaulter's Gap Beds]	*Aulacostephanus eudoxus, A. pseudomutabilis, Asp. longispinum,* (but not *A. acanthicum* nor *A. caletanum*), *Cardioc. anglicum, C. krausei*

Sequence VII — Ringstead Bay, Dorset
(Salfeld, p. 204)

Correlation	*Strata*	*Fauna*
Pseudovirgatitan		
scruposus	31. Oil Shales	*Discina latissima*
Physodoceratan		
pseudomutabilis	30. Clay	*Aulacostephanus eudoxus, A. pseudomutabilis, Cardioceras anglicum*
	29. Limestone	*Trigonia voltzi*
Rasenian		
mutabilis	28. Clay	*Rasenia mutabilis, Exogyra virgula*
kitchini ?	27. Clay	*Cardioceras kitchini, C. cricki* ; Rasenias of the groups of *R. cymodoce* and *R. uralensis*
cymodoce *uralensis*		
	26. Clay	
uralensis ? *cricki ?*	25. Marly Clay	*Cardioceras kitchini, Rasenia uralensis*
	24. Two red calcareous bands	
	23. Clay	
	22. Clay	*Ostrea deltoidea*
	21. Clay	
	20. Clay	*Ostrea deltoidea*
baylei	19. Sandy clay	*Pictonia baylei, P. normandiana*
	18. Clay	*Exogyra nana*

Sequence VII (continued)

Correlation	*Strata*	*Fauna*
Ringsteadian		
brandesi	17. Sandy clay	*Rhynchonella inconstans, Ringsteadia pseudocordatus, R. brandesi* etc.
pseudocordatus	16. Ironshot Oolite	*R. pseudo-cordatus*
	15. Clay	
	14. Clay	
	13. Red, sandy limestone	*R. pseudo-cordatus*

Sequence VIII—North Ferriby

East Yorkshire, a boring. Specimens submitted by Geological Survey of England

Correlation	*Strata*	*Fauna*
Prionodoceratan		
superstes ? *prionodes*	1. At 23 to 26 feet down	"Amoebocerates" and *Prionodoceras*
dichotomum	2. At 30–35 feet	*Dichotomoceras dichotomum*
Dichotomoceras sp.	3. At 50 feet	*Dichotomoceras* sp. stouter than *D. dichotomum*
Uncertain	4. At 60 feet	"*Amoeboceras*" sp. with fine ribs and intercalated secondary ribs
Uncertain	5. At 120 to 130 feet	"*Amoeboceras*"

One important point here is the position of *Dichotomoceras* not far below *Prionodoceras*, a position confirmed in Scotland (see Seq. X). The other important point is the repetition of "*Amoeboceras*" forms. The earliest forms, some 100 feet below *Dichotomoceras*, seem to be too far down to be later than Ringsteadian; but they were not satisfactorily identifiable with the true Amoebocerates of the White Jura *a* (Perisphinctean). Much time, however, will be required before all the varied Amoebocerate forms can be worked out—there is too much else claiming attention.

A boring in Norfolk gave evidence of *Ammonites superstes*, Phillips, below *Rasenia stephanoides*. This Ammonite is an Amoebocerate. The Norfolk boring, therefore, takes the Yorkshire succession further up, but see Scottish evidence, Seq. X.

Sequence IX—Scotland, East Coast
(Upper and Middle Oolites)

Counties of Sutherland and Ross and Cromarty — generalized sequence. The succession is surmised in certain cases; in others it may be known from the relative geographical positions of the strata—much information kindly given by Dr. G. W. Lee (G.W.L.). Specimens were submitted by the Geological Survey of Scotland.

Only the sequence down to No. 14 is connected with Table III: the remainder will be required later.

Correlation with England	*Strata and Localities*	*Fauna*
Kimmeridge Bay, Gaulter's Gap Beds	1. Golf Links, Loth Railway Station	*Aulacostephanus* cf. *eudoxus*
Ringstead Bay 28	2. Ethie Beds	*Rasenia* cf. *mutabilis*
	3. Ethie Beds; Wester Garty; Kintradwell; Loth River Shales	*Rasenia* cf. *striolaris*
	4. Ethie Beds	*Amoeboceras* sp. (spinous)
.	5. Boulder Bed (*Rh. sutherlandi* Bed), Wester Garty and Portgower	*Amoeboceras* cf. *kitchini* etc. *Rhynchonella sutherlandi, Terebratula joassi*
Brill Clay	6. Loth River Shales; Wester Garty; Kintradwell	*Rasenia* cf. *stephanoides*
Market Rasen	7. Ethie and Kintradwell Beds	*Rasenia* cf. *cymodoce*
Ringstead 25; Abbotsbury Iron-ore	8. Portgower, Navidale, Helmsdale	*Rasenia* cf. *uralensis*
. .	9. Loth River Shales; Kintradwell	*Amoeboceras* cf. *cricki/ovale*
	10. Loth Point Bed, clays	*Rasenia* cf. *A. circumplicatus*, Quenstedt
Abbotsbury Iron-ore, lower bed (in part)	11. Allt na Cuille Sandstones	*Rasenia* cf. *A. circumplicatus*. Many inconstantiform Rhynchonellids, cf. *R. corallina*, Haas
	12. Allt na Cuille Sandstones	*Rasenia* spp.
Wootton Bassett Beds	13. Allt na Cuille Sandstones; Port an Righ Nodular Beds	*Pictonia*
Brill Serpulite Bed Ickford Clays Shotover Clay North Ferriby Boring, lowest bed	14. Port an Righ Nodular Beds	*Am. superstes* *Prionodoceras* *Dichotomoceras* "*Amoeboceras*"
Headington Beds (Corallian Limestones)	15. Port an Righ Sandstones	*Perisphinctes* cf. *wartæ*, *P.* cf. *biplex*
Lower Calcareous Grit (Up. part), S. Engl., Mid. Calc. G., Yorks	16. Port an Righ Ironstones	*Kranaosphinctes, Cardioceras, Goliathiceras* etc.

SEQUENCE IX (continued)

Correlation	*Strata*	*Fauna*
Lower Calc. Grit, Yorkshire (in part). Upper part of Oxford Clay, Yorkshire	17. Clyneleish Yellow Beds; Ardassie Limestone, top part	*Rhynchonelloidea thurmanni, Korythoceras?* "*Cardioceras*" spp. (binodulates); *Klematosphinctes*
	18. Ardassie Limestone, lower part, (Ardassie Limestone, over 20 feet thick, G.W.L.)	"*Cardioceras*" cf. *tenuicostatum*, "*C.*" cf. *excavatum* (thin)
	19. Brora Sandstone, 180 feet, G.W.L.	*Pteria braamburiensis* (G.W.L.)
Cf. Weymouth Clays with kidney-stones, 250 feet thick (H. B. Woodward Jur. Rocks V, 1895, 15)	20. Uppat Sandstones (overlaid by sandstone, and not far above Fascally Clay, G.W.L.)	"*Card.*" cf. *vertebrale* Damon, 1, 2; "*C.*" cf. *cordatum*, d'Orbigny, CXCIV. 2. 3. Fossils poor
Studley Beds, Up. Oxford Clay, Oxfordshire	21. Port an Righ Shales	*Card. scarburgense, C.* cf. *cardia. C.* cf. *tenuicostatum*
Horton Beds, Oxfordshire	22. Port an Righ Limestones	*C. scarburgense, C.* cf. *cardia*
Kelloway Rock, Yorkshire, upper part	23. Clyneleish White Bed, 20 feet thick, G.W.L.	*Aspidoceras silphouense*, CCCLXIVA; *Sutherlandiceras*, CCCXX; *Eboraciceras*
Tidemoor Point Beds, Weymouth	24. Port an Righ Calcareous Sandstone; Fascally Sandstones	*Bourkelamberticeras* cf. *lamberti*, etc.
Kelloway Rock, Yorkshire, middle part	25. Fascally Sandstones, lowest part	*Peltoceras* cf. *subtense*
Christian Malford Beds, Wilts, and Calvert Beds, Bucks	26. Port an Righ Shales and Doggers; Fascally Shales, (Brickyard Beds)	"*Kosmoceras*" cf. *stutchburii*, "*K.*" cf. *elizabethæ*, etc. *Zugokosmokeras zugium*, T.A., Pl. CCCLXXXIX
Trowbridge Beds?	27. Lower Brora, Upper Clays	"*Kosmoceras*" cf. *jason*
	28. Lower Brora, Lower Clays	"*Kosmoceras*" cf. *enodatum*
Kellaways Clay (a), Wiltshire	29. ROOF BED	*Proplanulites, Gowericeras*

The strata in Sutherland—Nos. 17–20, 23–28—are some 560 feet in thickness (G.W.L.), not counting 20, the Uppat Sandstones, which are of unknown extent. Thus the strata 24, Fascally Sandstones, to 28, Roof Bed, are about 340 feet thick. An interesting point is the considerable thickness developed in beds which may be said to hover on the Corallian-Oxford Clay border-line—Beds 17 to 23: they may possibly represent deposition to a thickness of over 500 feet, and yet

there are many non-sequences. So that a time-interval of over 500 to perhaps 1,000 feet of deposit may really separate certain Corallian–Oxfordian beds which, in places, are almost or even quite in contact.

Evidence in regard to Nos. 1–14 is given in Seqq. X—XV following.

Sequence X — Port an Righ, Scotland

Port an Righ, Balintore, Ross. Specimens found loose on shore

Correlation	*Strata*	*Fauna*
Rasenian *baylei*	Round nodules	*Pictonia* cf. *parva*, Tornquist
Prionodoceratan *prionodes*		*Prionodoceras* aff. *serratum* and several other spp.
dichotomum		*Dichotomoceras* aff. *dichotomum*
Cf. Seq. VIII, 5		Amoebocerates comparable with earliest N. Ferriby specimens

The point here is the association of *Prionodoceras* and *Pictonia* with the confirmation given to Sequence VIII in regard to *Dichotomoceras.* That genus cannot, as I supposed, belong to the Perisphinctean (Argovian), Pl. CXXXIX ; its locality was correctly given as Oxford, that is, Shotover ; and it is not a species of the Ampthill Clay, like as it is to several of them. According to the evidence of this Scottish locality, *Dichotomoceras, Prionodoceras* and *Pictonia* are associated : according to Seq. VIII, p. 39, *Dichotomoceras* is a few feet lower than *Prionodoceras.*

Sequence XI — Wester Garty, Scotland

Correlation	*Strata and Localities*	*Fauna*
Doubtful Rasenian *kitchini*	1. Calcareous Sandstone—Shore 560 yards N.E. of Sron Rudha na Gaoithe, Wester Garty, Helmsdale	*Physodoceras* cf. *unispinosus*; *Rhynchonella sutherlandi, Terebratula joassi*
	2. Shales [and sandstone]—Shore 600 yards N.E. etc.	*Amoeboceras* cf. *kitchini* ; *Amoeb.* cf. *pingue* [in sandstone]
stephanoides	3. Shales—Shore 1,130 yards N.E. etc.	*Amoeb.* cf. *kitchini* ; *Rasenia* cf. *stephanoides*
desmonotus ? *kitchini*	4. Calcareous Sandstone—Shore 1246 yards N.E. etc. [A repetition of No. 1 ?]	*Rasenia* cf. *striolaris* ; *Rh. sutherlandi, Amoeb.* cf. *kitchini*

Sequence XII — Portgower, Scotland

Correlation	*Strata and Localities*	*Fauna*
Rasenian		
kitchini	1. Calcareous Sandstone in "Boulder Bed" — Shore ½-mile S.W. of Portgower, Helmsdale	*Rhynch. sutherlandi*
kitichini	2. Calcareous sandstone in "Boulder Bed" — Shore 710 yards S.W. of Portgower	*Terebratula joassi*; *Amoeb.* cf. *kitchini*
uralensis	3. Loose blocks of calcareous sandstone— Shore 250 yards S.W. of Portgower	*Amoeb.* cf. *kitchini*; *Rasenia* cf. *uralensis* (large fragment)

Sequence XIII — Helmsdale, Scotland

Correlation	*Strata and Localities*	*Fauna*
Rasenian		
cymodoce ?	1. Shales and thin calcareous sandstones— Shore 350–400 yds. N. of houses at Old Distillery, Helmsdale	*Rasenia* cf. *bifurcata*, Quenstedt sp.
uralensis	2. Shales and "boulder bed"—Shore 300 yds N. of houses, etc.	*Rasenia* cf. *uralensis*
uralensis	3. Shales and thin calcareous bands — Near Navidale House, Helmsdale	*Rasenia* cf. *uralensis*

Sequence XIV — Loth, Sutherland

Correlation	*Strata and Localities*	*Fauna*
Physodoceratan		
pseudomutabilis	1. Golf Links, near Loth Railway Station	*Aulacostephanus* cf. *eudoxus*
Rasenian		
desmonotus ?	2. Loth River Shales— Cliffs in N. bank of	*Rasenia striolaris*
kitchini	Loth River, where railway is bridged over	*Amoeboceras* cf. *kitchini*
stephanoides	stream, Loth, 4½-m. N.E. of Brora, Sutherland.	*Rasenia stephanoides*
cricki	Specimens mostly crushed	*Amoeboceras cricki/ovale*
circumplicatus	3. Nodule in clay, Loth Point, Loth	*Rasenia* cf. *circumplicatus*, Quenstedt sp.

Sequence XV — Allt na Cuille, Sutherland

Allt na Cuille Sandstones, Lothbeg, Brora. Ammonites as fragmentary casts of body-chambers

Correlation	*Localities*	*Fauna*
Rasenian		
circumplicatus	1. Old quarry, 250 yards up from railway	Many inconstantiform Rhynchonellids, cf. *R. corallina*, Haas; *Rasenia* cf. *A. circumplicatus*, Quen.; Amoebocerate?
Raseniæ	2. At cliff where railway crosses	Inconstantiform Rh.; *Raseniæ* spp. without ventral break;
baylei		*Pictonia*

Sequence XVI — Boulogne-sur-Mer (Salfeld, p. 222)

Correlation	*Strata*	*Fauna*
Pseudovirgatitan	2. Portlandien	
"*pallasianus*"	*a*. [4], 45 feet.	*Perisphinctes* der Gruppe des *Amm. pallasianus*
	b. [1], 21 ft.	*Virgatites quenstedti*
"*lomonossovi*"	[2], 15 ft.	*Per. boidini, P. devillei, P.* cf. *pallasianus, P. laumonossovi*
scruposus	*c*. 30 ft.	*Discina latissima, Gravesia portlandica, G. irius, Per. bleicheri*
Gravesian		
irius		
gravesiana	*d*. Grès et Sables de la Crèche, 42 ft.	*G. gravesi, Per. bleicheri*
Physodoceratan	3. Kimmeridgien	
longispinum	*a*. Marnes à Châtillon, 72 ft.	*Exogyra virgula*; *Aspidoceras longispinum*;
pseudomutabilis		*Aulacostephanus pseudomutabilis, A. eudoxus*
yo	*b*. Grès de Châtillon, 20 ft.	*Aulac. yo*
acanthicum	*c*. Calcaires du Moulin Wibert, 63 ft.	*Exogyra virgula*; *Aulac. yo, Aspid. acanthicum*; *Cardioceras beaugrandi*
orthocera	*d*. Marnes du Moulin Wibert, 84 ft.	*Exogyra virgula, Asp. orthocera*
lallerianum	*e*. Calcaires de Brecquerèque, 21 ft.	*Asp. orthocera, A. lallerianum, Rasenia erinus*
Rasenian		
mœschi	*f*. Grès de Questreques, 1 foot	*Rasenia mœschi, R. cymodoce*
cymodoce	*g*. Calcaires, 12 ft.	*R. cymodoce*
Ringsteadian	4. Séquanien	
brandesi	*a*. Oolithe de Hesdin l'Abbé, 30 ft.	*Ringsteadia brandesi*

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BY

S. S. BUCKMAN, F.G.S.

The illustrations from photographs by

J. W. TUTCHER

and

THE AUTHOR

PART XL

20 Plates

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Sequence XVII — Wurtemberg
(Salfeld, Tab. II etc.)

Correlation	*Strata*	*Fauna*
Gravesian		
irius	White Jura ζ	*Gravesia zieteni*; *Oppelia steraspis*
steraspis		
politus	W. J. ε	*Am. politus*,
biplex siliceus		*Am. biplex siliceus*
Physodoceratan		
pseudomutabilis	W. J. δ	*Aulacostephanus pseudomutabilis*
contejeani	W. J. γ—δ	*Aul.* cf. *contejani*;
balderum		*Idoceras balderum*
tenuilobata	W. J., upper γ	*Oppelia* [*Streblites*] *tenuilobata*
Rasenian		
polyplocus	W. J., lower γ	*Perisphinctes polyplocus*
platynota	W. J. β—γ	*Sutneria platynota*
planula	W. J., upper β	*Idoceras planula*
Ringsteadian		
brandesi	W. J. β	*Ringsteadia brandesi*
Perisphinctean	W. J. β	*Perisphinctes achilles*
	W. J. β	*Peltoceras bimammatum*
	W. J., upper α	*Impressa*-clay
	W. J. α	*Transversarius*-beds

Sequence XVIII — Mexico
(Burckhardt, Bol. Inst. Geol. Mexico, 23, 1906; 29, 1912; 33, 1919)

Correlation	*Strata*	*Fauna*
?	Upper Portlandian	*Proniceras*
Aulacosphinctean 2	Lower Portlandian	*Aulacosphinctes*, *Virgatites*
Mazapilitan 2	Base of Portlandian, Upper beds	*Mazapilites*, *Aspidoceras*
1	Base of Portlandian, Lower beds	*Mazapilites*, *Waagenia*
Gravesian 4	Argiles à *Waagenia* Top of Kimmeridgian	*Waagenia*, *Aspidoceras*
?	Couches à *Hapl. fialar* Upper Kimmeridgian	*Haploceras fialar*, *Oppelia* cfr. *trachynota*
Physodoceratan 11 ?	Banc à *Aucella pallasi*	*Aspidoceras* cfr. *inflatum binodum*, Quenstedt
?	Couches à *Idoceras*,	*Neumayria*,
Physodoceratan 10 ?	Upper/lower Kimmeridgian	*Aulacostephanus*,
6		*Aspidoceras* cfr. *acanthicum*,
5		*Idoceras*,
4		*Nebrodites*,
3		*Streblites*

The following Sequence (XIX) of Scottish rocks is taken, with abridgements, from the first of the masterly papers by J. W. Judd on the Secondary Rocks of Scotland (Q.J.G.S., XXXI, 1873, 97–195). The sequence is that of his Tab. II ; but for the correlation with the Sequence already given (Seq. IX, p. 40) the fuller details of his Tab. I have been utilized. Sequence XIX is not given for any evidence of faunal succession, but for its value as presenting a bird's-eye view of the nature and thicknesses of the strata—necessary data for palæogeographical reconstruction, to combine with the evidence of Ammonites in any such essays.

Sequence XIX—Scotland, East Coast

(J. W. Judd, 1873, Tables I, II, abbreviated)

Correlation (T.A. IV, p. 40)		*Strata*		*Nature*	*Thickness* (in feet)
?	*z.*	Light-coloured and ferruginous sandstones		Estuarine	100 +
IX, 1—8	*y.*	Coarse shelly limestones	Brecciated Beds	Marine	500 +
	x.	Carbonaceous shales		Marine & Estuar.	
?	*w.*	Sandstones (casts of marine shells)		Marine	50?
IX, 9—10	*v.*	Sandstones, coaly seams		Estuarine	150 +
IX, 12, 13	*u.*	Sandstones, marine shells		Marine	?
IX, 17, 18	*t.*	Limestones, clays and sandstones		Marine etc.	200?
IX, 19	*s.*	Sandstones, coaly seams (several marine bands)		Estuarine	400
IX, 20, 23	*r.*	Fine-grained sandstones		Marine	25
IX, 24, 25	*q.*	Sandy shales, few fossils		Marine	150
IX, 26, 27	*p.*	Pyritous and laminated shales		Marine	80
IX, 28	*o.*	Black laminated shales, septaria, shelly bands		Marine	70
IX, 29	*n.*	Calcareous sandstone (" Roof Bed ")		Marine	5

In this Sequence there are more than 1730 feet of strata. Allowing for beds not measured, there may be supposed to be over 2,000 feet from Callovian to lower Kimmeridgian (Proplanulitan to Physodoceratan), and yet there are several gaps.

This brings to a close, at any rate for the present, the account of the Chronology of the Jurassic so far as the Upper Oolites are concerned. It will be for the next volume to carry the study further. But the present opportunity may be taken to say a few words upon the method used in constructing the Hemeral Tables from the evidence of the Sequences.

A good example is furnished by a comparison of the Portland beds of Oxfordshire (Seq. II, p. 28) with those of Swindon (Seq. III, p. 29). In the first case, one stratum, Shotover Grit Sands, gives three elements in the fauna without evidence as to their succession—*Paravirgatites*, *Am.* cf. *devillei* and *Am. pectinatus :* a definitely lower bed, the Wheatley Sands, of different lithic character, yields another element, *Wheatleyites*. So far, there is evidence for no more than two hemeræ. Let these be called, provisionally, *pectinatus* and *Wheatleyites*. But Swindon shows no change of matrix during these two hemeræ—that is to say, the species

occur in one bed (see Pls. CCCLIV B and CCCLXXXIII B); but it gives *P.* cf. *devillei* in a higher stratum than *Am. pectinatus*, and there is reason to suppose that *Paravirgatites* is from a still higher horizon (see Pl. CCCVIII B)—at any rate, it has another distinct matrix. So there is this result: Oxfordshire for four forms shows two matrices, Swindon, for the same four forms, three matrices; but Swindon parts the three which Oxfordshire puts together, and Oxfordshire parts the two which Swindon unites—thus proving the four forms to be in sequence, so that four hemeral terms are required—three on the evidence of Swindon, two on the evidence of Oxfordshire, minus the one in common, makes four.

The argument from dissimilar matrices—more dissimilar, anisopetrous—may be presented. Two authors describe sequent beds at localities A, B, some distance apart. One author describes the lower deposit, *A*, which is argillaceous; the other author describes the higher horizon, *B*, which is calcareous. Examination of the figured specimens shows that in the main the two Ammonite faunas are distinct, but that some 25 per cent. are common—the one author claiming them as constituents of the clay, the other of the limestone. To say that the common fauna passed up from one deposit to the other is incorrect. The true answer is that three faunas have been dealt with, a, the earliest, b, the common fauna, c, the latest. Thus there are three hemeræ, a, b, c, and during hemera b clay deposits prevailed at locality A, but calcareous deposits had begun at locality B. Therefore the constituents of the b fauna should be found in the highest clay beds of locality A, and in the lowest limestone beds of locality B. It may, further, be predicted that the fauna b will not be found in the calcareous beds of A, nor in the argillaceous beds of B.

This argument from dissimilar matrices can be employed to predict the hemeral sequence of a given fauna when hemeral or zonal analyses have not been carried far enough. Some years ago, because certain Ammonite species were found in different parts of the south-west of England in clay, sand and limestone, which are sequent throughout the region, it was said that these Ammonites passed up through three formations. Detailed investigation showed that such was not the case—that there were always the same sequences of species, that clay, sand and limestone were being deposited simultaneously at different localities, and that there was no case of passing up in any one locality.

It is from considerations such as these, where direct evidence of superposition was lacking, that the hemeral tables have been constructed. But that the Tables are free from mistakes is too much to expect.

The illustrations of Ammonites which have been given in the four volumes of this work are intended not only for the use of the specialist, but for the assistance of any student of Mollusca seeking to identify the specimens in his collection. For this reason there has been given in each case, at the top of the legend footing each plate, the name which the species has borne in literature, or, failing that, the name which it has received in public or private collections, or, failing that, the name which has or might have been applied to it by the field-geologist. Therefore, if the student is aware of the name which has hitherto been applied, even in a general way, to the specimen which he is seeking to determine, he can look up that name in the index, and will find references to the plates which have been given of the species bearing that name. Thus, instead of aimlessly turning over plates, only to become more and more bewildered by a seemingly endless array of forms, the student can,

if he works methodically, bring the number of plates, which it is necessary for him to consult, within quite reasonable limits.

Another method presents itself—the stratigraphical. The student has possibly a shrewd idea as to the formation from which his specimen has been obtained. He should then look for the genera which have been figured from that formation. For his help in this search there was given in the Appendix to Vol. II, p. c, a Chronological Analysis of the genera illustrated in those two volumes: now there is given a similar analysis of the genera figured in Vols. III, IV. The translation of the chronological terms into the ordinary formation names, or *vice versa*, may be learnt from Table I of Vol. IV (pp. 6–13). The student using these two methods should quickly and easily find what he seeks, if it is figured in these volumes; but he may find nothing like his specimen; because it has to be remembered that among the rich fauna of Jurassic Ammonites there are yet many series untouched in these volumes.

Chronological Analysis — II

(Pls. CXXXI—CDXXII. Genera in approximate chronological order—late to early—in each Age. . See Vol. II, App. p. c.)

Ages *Genera*

GIGANTITAN: Glottoptychinites, Titanites, Briareites, Gigantites, Galbanites, Trophonites.

BEHEMOTHAN: Crendonites, Simotoichites, Leucopetrites, Glaucolithites, Behemoth.

PARAVIRGATITAN: Lydistratites, Paravirgatites, Pectinatites, Wheatleyites.

PRIONODOCERATAN: Prionodoceras, Dichotomoceras.

RINGSTEADIAN: Ringsteadia.

PERISPHINCTEAN: Perisphinctes.

CARDIOCERATAN: Vertebriceras, Anacardioceras, Kranaosphinctes, Goliathiceras, Chalcedoniceras, Sagitticeras, Korythoceras, Miticardioceras, Klematosphinctes, Neumayriceras, Hortoniceras.

VERTUMNICERATAN: Pavloviceras, Alligaticeras, Poculisphinctes, Putealiceras, Aspidoceras, Sutherlandiceras, Eboraciceras, Bourkelamberticeras.

KOSMOCERATAN: Longæviceras, Trinisphinctes, Binatisphinctes, Hamulisphinctes, Rursiceras, Weissermeliceras, Zugokosmokeras, Gulielmites, Gulielmiceras.

PROPLANULITAN: Galilaeanus, Sigaloceras, Crassiplanulites, Galilaeites, Galilaeiceras, Cadoceras, Proplanulites, Gowericeras, Toricellites.

MACROCEPHALITAN: Pleurocephalites, Tmetokephalites, Macrocephalites, Macrocephaliceras, Toricelliceras, Kepplerites, Catasigaloceras, Anaplanulites, Catacephalites, Dolikephalites, Kamptokephalites, Homœoplanulites, Cerericeras.

OXYCERITAN: Suspensites.

TULITAN: Morrisiceras, Tulites, Bullatimorphites, Morrisites, Tulophorites, Madarites, Rugiferites, Pleurophorites, Sphæromorphites.

GRACILISPHINCTEAN: Gracilisphinctes.

ZIGZAGICERATAN: Zigzagites, Parkinsonites, Zigzagiceras, Procerites, Ebrayiceras, Polysphinctites, Planisphinctes, Patemorphoceras.

PARKINSONIAN: Haselburgites, Œcoptychoceras, Phanerosphinctes, Polystephanus, Stegeostephanus, Dimorphinites Vermisphinctes, Prorsisphinctes, Stomphosphinctes, Diplesioceras, Parkinsonia, Garantiana.

STEPHEOCERATAN: Hlawiceras, Pseudobigotella, Rhabdodites, Cadomoceras, Strenoceras, Leptosphinctes, Caumontisphinctes, Sphæroceras, Nannolytoceras, Teloceras, Chondroceras, Epalxites, Masckeites, Stepheoceras.
SONNINIAN: Kallistephanus, Rhytostephanus, Œcostephanus, Skirroceras, Skolekostephanus, Otoites, Papilliceras, Sonninia, Amblyoxyites, Labyrinthoceras, Kumatostephanus, Frogdenites, Witchellia, Emileia, Lissoceras, Mollistephanus, Stiphromorphites, Pelekodites, Zugophorites, Sherbornites, Fissilobiceras, Trilobiticeras, Docidoceras, Graphoceras, Kleistoxyites, Eudmetoceras, Euaptetoceras.
LUDWIGIAN: Abbasites, Ambersites, Planammatoceras, Manselia, Erycites.
DUMORTIERIAN: Xeinophylloceras.
GRAMMOCERATAN: Pachammatoceras, Hammatoceras, Phlyseogrammoceras, Esericeras.
HAUGIAN: Thysanoceras, Catacœloceras, Phymatoceras, Pelecoceras.
HILDOCERATAN: Planulites, Frechiella, Hildoceratoides.
HARPOCERATAN: Hildaites, Dactylioceras, Pseudolioceras, Porpoceras, Murleyiceras, Paltarpites.
AMALTHEIAN: Paltopleuroceras, Argutarpites, Amauroceras.
LIPAROCERATAN: Beaniceras.
POLYMORPHITAN: Tragophylloceras, Kallilytoceras, Coeloceras, Jamesonites, Phricodoceras.
DEROCERATAN: Apoderoceras, Crucilobiceras.
OXYNOTICERATAN: Fastigiceras, Victoriceras, Tutchericeras, Oxynoticeras, Retenticeras.
ASTEROCERATAN: Arietites.
CORONICERATAN: Agassiceras, Aetomoceras, Ammonites.
CALOCERATAN: Schlotheimia, Caloceras, Psiloceras.

To attempt the identification of an Ammonite without first making observations as to its characters, the nature of its venter, of its rib-curve, of its ribbing, and most especially of its suture-line, is only to court disaster. Nor should the student venture to give to a specimen from one formation the name of a species from another formation, even though, locally, he may find the two formations in contact, and may therefore think that the time-interval between them is only a very short one: this will be certain to bring trouble. Those who lightly say "this species may or must have lived on longer in our area than in others" should first reflect on the extraordinary palæo-geographical complications which would ensue if their words were correct, as well as on the fact that zonal work—the identification of the position of strata by means of Ammonites—would be worthless. There are many cases of the repetition of like forms (heterochronous homœomorphy) which may easily mislead those who do not proceed with caution and examine minutely, especially for internal characters. To explain by an airy phrase, without due knowledge of facts and without mature consideration of the consequences involved, is a serious fault—unhappily, far too common in geological work.

A particularly unfortunate example of the danger of extending the range of Ammonites—of identifying the species of one formation with those of another—is shown in the recently-published work of Marcel Lissajous (Faune Bathonien de Mâcon; Lab. Géol. de Lyon, III, 1923). He identifies certain Bathonian species from his zone of *arbustigerum* with species which I named from the *zigzag* bed of the Inferior Oolite. Now the *arbustigerum* zone is the equivalent of the Great Oolite of

Minchinhampton, possibly only the upper part of that (Oxyceritan, *suspensus*, T.A. CCCXLVI). This zone is spoken of as " les premiers sédiments Bathoniens " (Lissajous, p. 16), reposing, in the neighbourhood of Mâcon, upon strata of the " Bajocien," presumably Parkinsonian, *Garantiana*. Such superposition has led the author to think that the time-interval between the deposits is a small one ; but in England, between the Inferior-Oolite strata from which my species came (Zigzagiceratan, *zigzag*) and the Great Oolite strata of Minchinhampton, there are the following thick deposits : Fullers' Earth, Stonesfield Slate and much of the Great Oolite strata of Bath, which are earlier than the beds of Minchinhampton. Separating the two deposits there may be a thickness of as much as 500 feet.

To say that the same three species of Ammonites endured through a time-interval represented by the deposition of some 500 feet—that the species which belong to the *zigzag* bed of the Inferior Oolite of England migrated to re-appear after all that interval in strata of the east of France, equivalent to the Great-Oolite beds of Minchinhampton, is to ask for something quite contrary to all experience in regard to the duration of Ammonite species. If they are the same species, the explanation in the Mâcon case might more reasonably be derivation from destroyed local deposits of *zigzag* date. But in my opinion they are not the same species—there is not even sufficient external likeness to warrant the assumption ; while, had the suture-lines been investigated, I feel certain that undoubted differences would have been revealed.

From this may be learnt two rather important lessons : 1, the danger of claiming identity for species of quite different dates ; 2, that it is as important to prove identity as to disprove it — that external similarity is an untrustworthy guide, and that it is necessary to prove identity of suture-line before claiming similar-looking forms as the same species. More trouble is caused by placing different forms under the same name than by putting the same forms under different names.

Another warning seems advisable—that it is dangerous to place a series of, say, Continental forms as varieties of an English species without having among them an example which is identical with the English type. This should be the first thing to establish, and should be the starting-point of the investigation. The converse is my method in the identification of English with Continental species. This instance may be given : it is dangerous to regard, say, Continental Stepheocerates as varieties of *Stepheoceras humphriesianum* until an exact Continental counterpart of that species can be produced. For this reason—the stratum yielding *S. humphriesianum* is preserved only very locally in this country, and it was, where preserved, nearly removed by penecontemporaneous erosion—the half condition of the type is due to the planing away which it suffered while lying in the rock. It has yet to be proved that any stratum of exact date with that of *S. humphriesianum* exists on the Continent : it may have been altogether destroyed from there. And if the Continental forms of *humphriesianum*-aspect are not exactly synchronous with the English species, they cannot be varieties of it. Stepheoceratids persisted through several hemeræ, but there is not yet evidence that *Stepheoceras* did.

The Chronological Analysis of genera in Vols. III, IV, given in p. 48, reveals a very large number of generic names. But wholly false conclusions may be drawn from this. One reason for the number is that an attempt is being made to give a synopsis of the rich Jurassic Ammonite fauna, so that, at least, there may be a generic name to give

to species otherwise unnamed. Therefore, in most cases, only one or two species have been figured out of many belonging to a genus: this makes the number of generic names large in proportion to the number of species. But the number of generic names is wholly relative: it depends on the length of time which was taken for the deposition of the Jurassic rocks and on the richness of the faunas which have been preserved.

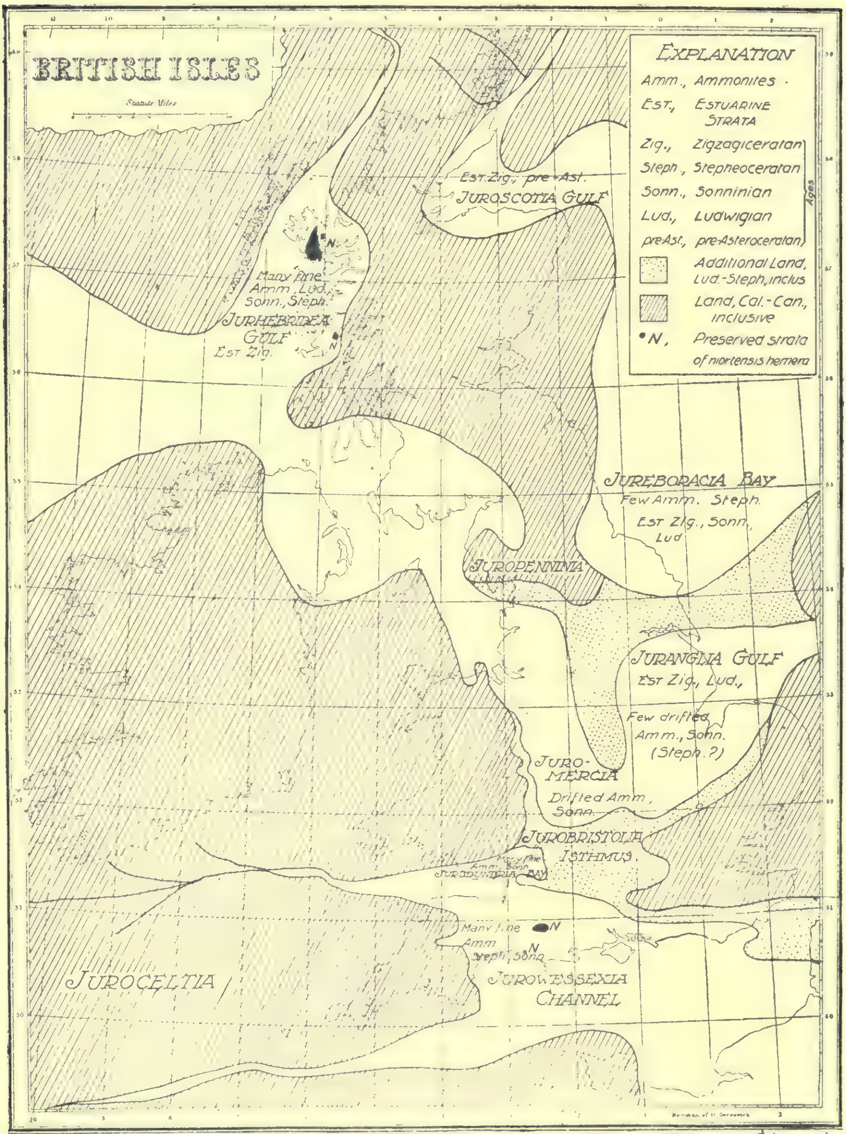
All recent researches tend to show that the time-interval required for the deposition of the Jurassic rocks must be one of very great duration—multiplication of former estimates by tens or, possibly, by hundreds must be made. The old idea that a bed of, say, five feet crowded with layers of Ammonites represented quick deposition—a catastrophic overwhelming by mud bringing about a sudden entombment—is now proved to be wholly erroneous. When the different layers of such a bed are traced laterally across country they are found to thicken out into 1,000 or more feet of strata—a multiplication by 200; and that may be only the beginning of such discoveries in regard to lateral expansion. So that instead of a bed crowded with Ammonites being regarded as a case of quick deposition, it has now to be looked upon as an instance of very slow deposition—a rich fauna accumulated owing to extreme paucity of sedimentation.

Twenty generic names given to similar-looking forms from a thin bed of supposedly two dates may seem excessive; but when investigation of other areas shows that the number of dates has to be multiplied by ten, so that the number of generic names given to contemporaneous species has to be divided by ten, the case assumes quite a different aspect.

A student with some two or three hundred Jurassic Ammonites may, if he find that each specimen should bear a different generic name, be inclined to criticize the number of generic names as excessive. But he is wholly incompetent to express an opinion on such poor experience. British Jurassic Ammonites have to be studied in their thousands—so rich is the fauna, so great is the number of beds into which the Jurassic strata have to be divided and so limited in certain cases are the exposures of particular dates. Possibly, if all the collections of such Ammonites in the British Islands were placed together, they would be proved to be incomplete by the next month's systematic collecting—some exposures of known richness have hardly been touched, so short a time were they open, so long have they been closed. Possibly, such collections would not represent anything like the full tale of Ammonite species once entombed in the British Islands, for there is reason to suppose that many beds have been removed entirely, and in other beds all the specimens have been destroyed by chemical action. . Certainly any one collection, large though it may be, quite inadequately represents even the collected fauna of British Ammonites.

Critics of the number of generic names of Ammonites, merely on the ground of their number, should bear such conclusions as these in mind, and they should also remember that generic names are given to record facts—it may be that in the case of two similar forms the suture-line of one is florid, while that of the other is simple; or it may be merely that, in similar case, in one form the external lobe is longer than the superior lateral, while in another the reverse obtains. But these details are shown in the plates; also, they are sometimes noted in the legends. A critic of generic names will readily grasp these details before making his criticisms; but if he argues that these details are insufficient to justify generic names, then it can only be replied that he has no idea of the richness and variety of the Ammonite fauna, nor any conception

MAP A



Cal-Can, Caloceratan - Canavarinan Ages (Hettangian to lower Aalenian Stages)

British Isles. Distribution of Land and Water
Ammonitoidic (Jurassic) Period
Arietal to early Coronatal Epochs. See pp. 16-24 and 53

of the magnitude of the task. To obtain such knowledge, he might confine his work to studying one small family of Ammonites or a very limited set of strata, gathering for a few years all the material possible. Then, one may expect, judging from recent papers done by other workers under these conditions, that he would end by finding the genera in "Type Ammonites" insufficient, and would proceed to divide them further. He would realise that the idea of the number of genera being large, having regard to the vast amount of material seen, is quite an illusion.

. There is a considerable practical bearing in the giving of generic names to small details of difference, whether of suture-line or ornament. When such details possess distinct names, the memory can retain the differences, which it is unable to do if they be unlabelled. In well-sinkings, borings and such like, the determinations as to the strata pierced and the chances of success have often to be made on very fragmentary material. Here the advantage of having had small differences duly noted is vital—the knowledge leading to correct determination may mean, in the advice given, all the difference between losing or saving some hundreds of pounds. Certain costly failures should not have occurred had the fact that what seem to the layman no more than the differences between Tweedledum and Tweedledee been named and noted.

For it must be remembered that the difference between dum and dee and failure to know which is which may mean an error of some magnitude. If dum and dee lay side by side, failure to distinguish them by name would not be so important ; but so often they are widely separated—there is repetition of like forms : then failure to note and know the difference may mean so much. It has just been seen how great is the likeness between forms of the Great and the Inferior Oolite, separated vertically by some hundreds of feet.

The difference between *Suspensites* of the Minchinhampton Great Oolite and *Zigzagiceras* of the Inferior Oolite is little more than the difference between Tweedledum and Tweedledee—at least, it would seem so, if they were submitted as fragments from a boring. But the much simpler suture-line and short L1 of the higher form—L1 may be visible even in a fragment—would be sufficient. The suture-line of *Suspensites* looks like a suspended bridge of a single arch, that of *Zigzagiceras* like a two-arched bridge with elaborate pillars.

PALÆOGEOGRAPHY

The map A given in the opposite page is an attempt to illustrate approximately the distribution of land and water in the area of the British Isles during the early Ammonitoidic Period—in part explanation of the remarks made in pp. 16-24. Detailed discussion of this map must be deferred to a later Volume, when, also, it is hoped to issue further maps.

The descriptive naming of the seas presents a certain difficulty ; because it can only be temporarily correct. Land movements make changes—converting a channel into a bay, or the reverse. It is possible that the areas shown as sea are, in some cases, not large enough to provide for temporary extensions of submergence. And, possibly, too large an area of Palæozoic rocks has been marked as land. The absence of Jurassic (and Triassic) strata from Palæozoic rocks is not necessarily evidence that no Jurassic beds were deposited upon them. How great

may be the subsequent total removal of beds over large areas without leaving any trace is seen in the remarkably small patches of strata of *niortensis* hemera which are preserved : its sea must have made deposits over quite a wide expanse, little less than the area shown as water for the Stepheoceratan Age. In many cases, the length of time for such removal without trace was much less than a hemera ; but in regard to the removal of Jurassic strata from Palæozoic rocks there can often have been the time of Epochs, Periods, or much longer.

Systematic

To illustrate the method of working with regard to generic names there may be given here a series of short diagnoses.

Family *MACROCEPHALITIDÆ*

1. Catacephalites, Pl. CCLXXXIII. Sub-sphæroconic; flexicostate, ribs rather coarse ; suture-line sub-simple, lobes short, EL = L1.
2. Kamptokephalites, Pl. CCCXLVII. Compressed ; flexicostate, ribs coarse ; s. l. feeble, EL longer than L1.
3. Macrocephaliceras, Pl. CCCXIII. Sphæroconic persistent into smooth stage ; flexicostate, ribs medium size ; s. l. highly developed, EL = L1.
4. Pleurocephalites, Pl. CCLXXXIV. Sphæro- to subsphæroconic ; flexicostate, ribs fairly strong ; s. l. well developed, with long lobes, EL = L1.
5. Dolikephalites, Pl. CCCLXXII. Compressed ; flexicostate, ribs small, numerous ; s. l. feeble, EL longer than L1.
6. Macrocephalites, Pl. CCCXXXIV. Sub-sphæroconic ; recticostate, ribs small, numerous ; s. l., lobes short, but fairly ornate, EL = L1.
7. Tmetokephalites, Pl. CCCLXXIII. Compressed ; flexicostate, ribs small, numerous ; s. l. very elaborate, EL = L1.

The differences between these genera should be fairly obvious ; but they may more readily be grasped if put into tabular form, taking just the three characters, shape, degree of costation and complexity of suture-line, giving to each a numerical value greater for its departure from a supposed common primitive form. Thus the coarser the costation, the lower the number ; the more complicated the suture-line, the higher the number.

Table A—Macrocephalitid Genera

Genus	*Shape*	*Ornament*	*Suture-line*	*Totals*
1. *Catacephalites*	subsphær., 3	coarse, 2	1	6
2. *Kamptokephalites*	compressed, 4	coarse, 1	3	8
3. *Macrocephaliceras*	sphæroc., 1	medium, 3	5	9
4. *Pleurocephalites*	subsphær., 2	medium, 4	6	12
5. *Dolikephalites*	compressed, 6	fine, 5	2	13
6. *Macrocephalites*	compressed, 5	fine, 5	4	14
7. *Tmetokephalites*	compressed, 6	fine, 5	7	18

The totals, therefore, give the natural order.

These genera occupy different deposits—Cornbrash, genera 2 and 5,

Kellaways Clay, 3, 4, (and 7, see remark below), Kellaways Rock, 1, Callovian (foreign), 6, 7. It may be taken as certain that genera 3 and 4 are later than 2, 5. It may be assumed that the other genera are as late or later than those of the Kellaways Clay ; but the exact chronology is not proved.

From the external likeness of *Dolikephalites* to *Tmetokephalites*, the argument might be put forward that the difference in suture-line is sexual—the former with its simple suture-line being the male, and the latter with its elaborate one being the female. And as both were said originally to come from the same stratum and locality, Cornbrash, Peterborough, the suggestion seems to have force. But examination of the matrix of *Tmetokephalites* shows that it is not an English specimen. Comparison with Wurtemberg examples makes it fairly certain that the specimen is from there, from Oeschingen. So the sexual idea breaks down—where other sexual readings of Ammonites have failed—that the stratum or the locality, or both, are different : it is absolutely necessary that the individuals supposed to be two sexes of one species be syntopites : they must have lived in the same place at the same time.

Since this was written, an English example of *Tmetokephalites* has been seen—in an old collection lately acquired by Mr. Tutcher. It is from the Kellaways Clay of Wiltshire.

The likeness of these two genera shows the importance of ascertaining the suture-line. The identification of Ammonites is not difficult in itself ; it is only hard in that it demands time, observation and patience. At present, the suture-line can seldom be safely neglected. In the future, when the association of certain external features with certain suture-lines has been fully illustrated, it should be possible to predict what suture-line is associated with given external features ; for it may be taken as certain that there are such differences—in the case of these two genera rather more rib-flexure in *Dolikephalites* than in *Tmetokephalites*. But until these associations of features are known and proved by many more examples, the first necessity in the identification of Ammonites is to obtain the suture-line, often a laborious task.

The following rectifications of genotypes are necessary. They are due to the rule that the first output of a new generic name, definitely linked with a trivial name or names, makes the form or forms so cited the genoholotype or genosyntypes, as the case may be, although such was not the author's intention at the time of proposal. Certain generic names which were given in the following works take genotypes different from what were subsequently stated in my " Monograph of Inferior Oolite Ammonites "—in some cases the result is particularly unfortunate ; but there is good reason for the rule, although the author was not aware of the rule at the time.

In Mon. I.O. Amm., Sup., in consequence of plates and explanations being issued in advance of text, the following genotypes take precedence :

PLEYDELLIA, S. B. *P. comata* S. B. (Suppl. Pl. x, f. 11–13) is genotype, preceding *P. aalensis*.

BRASILINA, S. B. *B. crinalis* (Suppl. x, 29–31) and *B. baylei* (Suppl. xi, 34) are genosyntypes, preceding *B. tutcheri*. Genolectotype *B. baylei*.

The following casual citations in Proc. Cotteswold Field Club, XIII, 1901, p. 266, made genotypes :—

CYPHOLIOCERAS, S. B. " *C. opaliniforme* " precedes *C. plicatum*.

The trivial name *opaliniforme* was given to *Lioceras opalinum*, Mon. XIII, 1, 2, in "Jurassic Time," Q.J.G.S., LIV, 1898, 458. This becomes genotype.

LUDWIGELLA, S. B. "*L. concava*." Therefore specimens named "*concavus*" become genosyntypes, preceding *L. arcitenens;* out of them "*Ammonites concavus*, Sowerby, refigured S. B., Mon. II, 5, 6, Suppl. p. lxxxvi, fig. 51 a (*Ludwigella concava*) is taken now as genolectotype.

It may be noted here that the locality of Sowerby's specimen given as "neighborhood of Ilminster" (M.C. I, 214) is presumably Dinnington, about 2½ miles S.E. of Ilminster. Inferior Oolite species have been obtained from Dinnington with the characteristic ironshot oolite which is graphically depicted by Sowerby in his figure of *Am. concavus:* their matrix approximates to the Stoke Knap character. This ironshot shows that Sowerby's species is not from the Upper Lias, as has so often been erroneously supposed—the Upper Lias of the Ilminster district and much further afield is bluish and argillaceous or calcareo-argillaceous.

PHLYSEOGRAMMOCERAS, S. B. *Phylseogrammoceras*, misprint. "*P. dispansum*" precedes *P. metallarium*. Name covered several forms, but did not include Lycett's type (T.A. CCCXL), which had not been figured, and had not been seen by me. Genolectotype, *P. dispansum*, pars, =*P. electum*, T.A. CCCXCIV.

PSEUDOGRAMMOCERAS, S. B. "*P. struckmanni*" precedes *P. regale*. Out of the specimens assigned to *P. struckmanni* (Mon. cxlviii, cxlix) the specimen with radial line depicted, p. clxvii, fig. 143, is now taken as genolectotype.

In "Emendations of Ammonite Nomenclature," Cheltenham, 1902, the following accidentally become genotypes, though they were not intended to be :—

BRAUNSINA, S. B., p. 3. "*B. futilis*" (*Lioceras apertum*, Mon. XV, 7, 8) precedes *B. contorta*.

COTTESWOLDIA, S. B., p. 3. Several genosyntypes take precedence of *C. paucicostata*. Genolectotype, *C. costulata*, Mon. XXXIII, 3, 4.

DELTOIDOCERAS, S. B., p. 3. *D. subdiscoideum*, precedes *D. astrictum*. Genolectotype, *D. subdiscoideum* (*Hyperlioceras subdiscoideum*), Mon. XIX, 5, 6.

REYNESELLA, S. B., p. 5. "*R. piodes*" precedes *R. juncta*. Genolectotype, *R. piodes* (*Hyperlioceras walkeri*), Mon. XVI, 7, 8.

The following remarks are explanatory of certain genotypes :—

AMMONITES, Bruguière. Though subdivision of the genus *Ammonites* has proceeded for more than fifty years, no proper settlement of the genotype has yet been made. The history of the term is as follows:

In a systematic sense it dates from Bruguière (Encyclopédie Méthodique, Hist. Nat. des Vers, Tome 1, 1789, p. 28). All the species for which he used the name *Ammonites* are genosyntypes : out of them only can selection be made. Lamarck, in 1801 (Systéme des Animaux sans Vertèbres, p. 100), took one of these, *Ammonites bisulcata*, as "the example," which may be regarded as the type, of *Ammonites*. To figures of it he gave four references :—

"List. Conch. Angl. t. 6, no. 3
et Synops. t. 1041, f. 21.
Ammonis cornu . . . Lang. t. 24, no. 1.
Bourget, Pétrif. t. 41, no. 270."

These references are the same as the first four given by Bruguière, so the selection is narrowed down to them. As it happens, they only represent two specimens; for the two figures of Lister are the same, while the figure of Bourget is a reversed copy of that of Lang (Langius). Selection as between these two specimens is settled by Fischer (Man. Conch. (Fasc. 4), 1882, p. 390), somewhat indirectly. He definitely selected *Ammonites bisulcatus*, Bruguière, and showed that he fixed on an Arietes by giving a figure of such a form as *Am. bisulcatus* (Pl. III, fig. 7). But this figure cannot be the type, as it is later than Bruguière. However, as it is an Arietes, it excludes the figure of Lister, which represents one of the Amalthei.

Lister's figure now reproduced, Pl. CCCXCII, is the holotype of *Ammonites bisulcata*, Bruguière, for that author gives to it the definite commendation "Icon. bona." Such special selection of a figure marks it off from its fellows and elevates it to chief place—holotype. The figures of the other authors cited by Bruguière, therefore, are paratypes of *Am. bisulcata*. The figures of Lister, Lang and Bourget are the genolectotypes of the genus *Ammonites* according to Lamarck's choice, which is further narrowed, by Fischer's exclusion of Lister's figure, to the paratype of *A. bisulcata* figured by Lang. Therefore, a paratype of *A. bisulcata* becomes the genolectotype of *Ammonites*, but cannot retain the trivial name *bisulcata*, because that goes to the holotype. This holotype being a *Paltopleuroceras*, takes the specific title *Paltopleuroceras bisulcatum*, Bruguière sp. (see Pl. CCCXCII), while the paratype retains the generic name *Ammonites*. As it seems to be identical with *A. bucklandi*, Sowerby, it takes that trivial name, and so has the specific title *Ammonites bucklandi*, J. Sowerby (see Pl. CXXXIA).

'Planulites, Lamarck, 1801. This author (op. cit. pp. 100, 101) separated from *Ammonites* two genera: *Orbulites*, which may be a Goniatite, and *Planulites*, which has been supposed to be a *Clymenia*. But as Lamarck definitely gave the name *Planulites sulcata* to the example figured by Bourget (Pétrif. xlvi, 290), that becomes the genotype, though Lamarck's description might fit *Clymenia*. Bourget's figure, here reproduced for reference (Pl. CCCXCIII), would appear to be a Hildoceratid. The shading indicates, presumably, quite a shallow lateral sulcus—a character recalling *Hildoceras* and some Hildoceratoid forms which may be new.

The following alterations of generic names are required:—
Alligaticeras, nov. Genotype *Am. alligatus*, T.A. CCXII. Differences from *Dichtomoceras*:—external, ribs versi-radiate and presence of parabolæ: internal, ES with only small accessory lobe; L2 < Aux. 1 instead of L2 > Aux. 1.

For *Dichotomoceras* as generic name of *Am. ingens* (Pl. CLXXXIV), it is advisable to substitute temporarily "*Perisphinctes*." For *Dichotomoceras* as hemeral term for hemera post-*martelli*, *antecedens* may be substituted. The hemera *dichotomum* is much later, see pp. 35, 39, 40.

Acknowledgment

The Author's hearty thanks are offered to all those who have aided in this work: their names are already recorded in previous volumes or are noted in the legends of the plates. To them must, however, be added for special thanks, Professor Edgar Dacqué, Munich Museum,

who has rendered invaluable service in kindly sending over some of Oppel's important types; to Mr. Lionel T. Cranshaw, B.A., LL.M., for identifying and forwarding various further types from Whitby Museum; to Mr. C. P. Chatwin, F.G.S., for the compilation of the Index.

Gratitude is also expressed to the Subscribers for their continued kind support.

Addenda, Corrigenda

Page 16, line 16 up, for 'Oxfordshire—West' read 'Oxfordshire-West'
,, 26, l. 9, after 'Gigantids' place ')';
l. 12, for '4 . Isle' read '4-6 . Isle';
l. 20 up, for '*leucos*' read '*leucus*'
The following additional hemeral names may be inserted: to Gigantitan, 9, '*glottodes*,' see Pl. CDII; to Behemothan, 11, '*leptolobatus*,' see Pl. CDI.
,, 29, l. 3, for '5-7' read '5-8'
l. 22, delete 'Shotover Fine Sand'
,, 33, l. 4 up, for 'Ely, etc.' read 'Ely etc.,'
,, 34, l. 19, for 'contejani' read 'contejeani'
l. 8 up, for '*planulum*' read '*planula*'
,, 35, l. 26 down, ll. 5 and 7 up, for 'Wotton Basset' read 'Wootton Bassett'
,, 35, l. 21 up, for 'Minety,' given there on Phillips' authority ("K[immeridge] C[lay], Minety," Geol. Oxf., p. 332) read 'near Swindon.' Minety is too low for Kim. Clay; but the specimen may have been handed over with an incorrect locality.
,, 41, l. 16 up, remove '*Zugokosmokeras zugium*, T. A., Pl. CCCLXXXIX' to opposite Bed 27
ll. 12 and 10 up, after 'Upper Clays' and 'Lower Clays' add 'Fascally Shales'
,, 43, l. 8, for '*kitichini*' read '*kitchini*'
Plate CXXXIa, l. 2 up, delete 'sp'
,, CCLXVIIIb, line 2, for 'Schlottheim' read 'Schlotheim'
,, CCLXXXV, l. 5, for 'nov.' read 'S. Buckman, 1921, III, 48';
l. 6, for '*Morriceras*' read '*Morrisiceras*'
,, CCLXXXVI, l. 2, for '(near' read '[near'
,, CCLXXXIXa, l. 3, for 'Wurttemberg' read 'Württemberg'
,, CCLXXXIXb, l. 3, after '*macroceph.*' place '"'
,, CCXCVc, l. 1 up, for 'Condioceratan' read 'Cardioceratan'
,, CCCIV, l. 2, for '] z.' read 'z.]'
,, CCCXXXV, l. 1, for 'ạ' read '*a*'
,, CCCXXXVII, l. 2, for 'Langi' read 'Lang'
,, CCCXXXIX, l. 1, for 'Quenstediceras' read 'Quenstedticeras'
,, CCCXL, the fig. is slightly enlarged, about 1·1
,, CCCXLV, l. 1, delete the comma
,, CCCLIIIa, to top of Pl. put 'Fig. 1'; to S.W. corner add 'Fig. 2, N.S.'
,, CCCLVb, to 'Fig. 1' add '× 0·56'
,, CCCXCII, l. 2 up, for 'Bruguèire' read 'Bruguière'
,, CCCXCIX, l. 1 up, for '*Shirbiurnia*' read '*Shirbuirnia*'

Publication Details

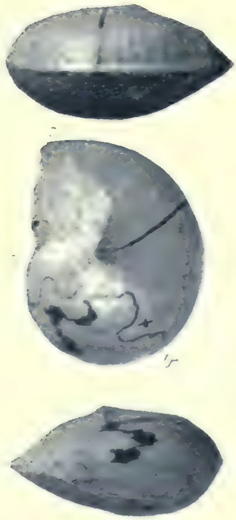
Parts	*Pages*	*Plates*	*Dates*
XXXI (20 plates)		CCLXVIIIA, B, C—CCLXIX, CCLXX, CCLXXIA, B, CCLXXIIA, B—CCLXXIII—CCLXXVI, CCLXXVIIA, B, CCLXXVIII—CCLXXXII ..	25, I, 1922
XXXII (20 plates)		CCLXXXIII, CCLXXXIVA, B, CCLXXXV—CCLXXXVIII, CCLXXXIXA, B, CCXC—CCXCIV, CCXCVA, B, C, CCXCVI—CCXCVIII	31, III, 1922
XXXIII (16 plates)		CCXCIX, CCCA, B, CCCI—CCCIV, CCCVA, CCCVIA, CCCVIIA, CCCVIII—CCCXIII	31, V, 1922
XXXIV (16 plates 4 reprints)	5–20	CCCXIV—CCCXIX, CCCXXA, B, CCCXXI, CCCXXIIA, B, CCCXXIII, CCCXXIVA, B, CCCXXVA, B, (Reprints of CCCB, CCCII, CCCVA, CCCXII)	4, VII, 1922
XXXV (20 plates)		CCCVB, CCCVIB, CCCVIIB, CCCXXIIC, CCCXXVI—CCCXXXIII, CCCXXXIVA, B, CCCXXXV—CCCXL	23, VIII, 1922
XXXVI (16 plates)		CCCXLI, CCCXLIIA, B, CCCXLIIIA, B, CCCXLIV CCCXLVA, B, CCCXLVI—CCXLIX, CCCLA, B, CCCLI, CCCLII	13, X, 1922
XXXVII (14 plates)	21–28	CCLXXXVII, CCCVIIIB, CCCLIIIA, B, CCCLIVA, B, CCCLVA, CCCLVI—CCCLXIIA	28, XII, 1922
XXXVIII (18 plates, 1 reprint, 1 portrait)	29–36	XXIIIA, CCCXXXVIIA, CCCXXXVIIIA, CCCLVB, CCCLVI*, CCCLXIIB, CCCLXIII, CCCLXIVA, CCCLXV—CCCLXVIII, CCCLXIXA, B, CCCLXX—CCCLXXIV, Portrait (J. Buckman)	22, II, 1923
XXXIX (20 plates)	37–44	CCCLXIVB, CCCLXXV—CCCLXXXII, CCCLXXXIIIA, B, CCCLXXXIV, CCCLXXXVA, B, CCCLXXXVI—CCCXCIA, ...	6, IV, 1923
XL (20 plates)		CXXXIA, CCLXVIIB, CCCXCIB, C, CCCXCII—CDVI	23, VI, 1923
XLI (16 plates)	1–4, 45–68	CDVII—CDXXII	31, VIII, 1923

Index

Fig. 3

Fig. 1

Fig. 2



× 1·9

FRECHIELLA cf. SUBCARINATA; S. BUCKMAN, 1922, cit. spec. Q.J.G.S., LXXVIII, 440, § VIII, D [derived ?]; "Watton Cliff, Eype, Dorset; Junct. Bed"; S.B. Coll. 3903, pres. Mr. Jas. F. Jackson (5684) S. 8·75, —, 63, —; 17, 50, 53, 20·5; *a. Cymbites* stage, venter rounded *b.* venter angulate; *c.* venter subcarinate, no furrows

FRECHIELLA SUBCARINATA, YOUNG & BIRD sp. 1822
Hildoceratan, *subcarinata*

× 0·32

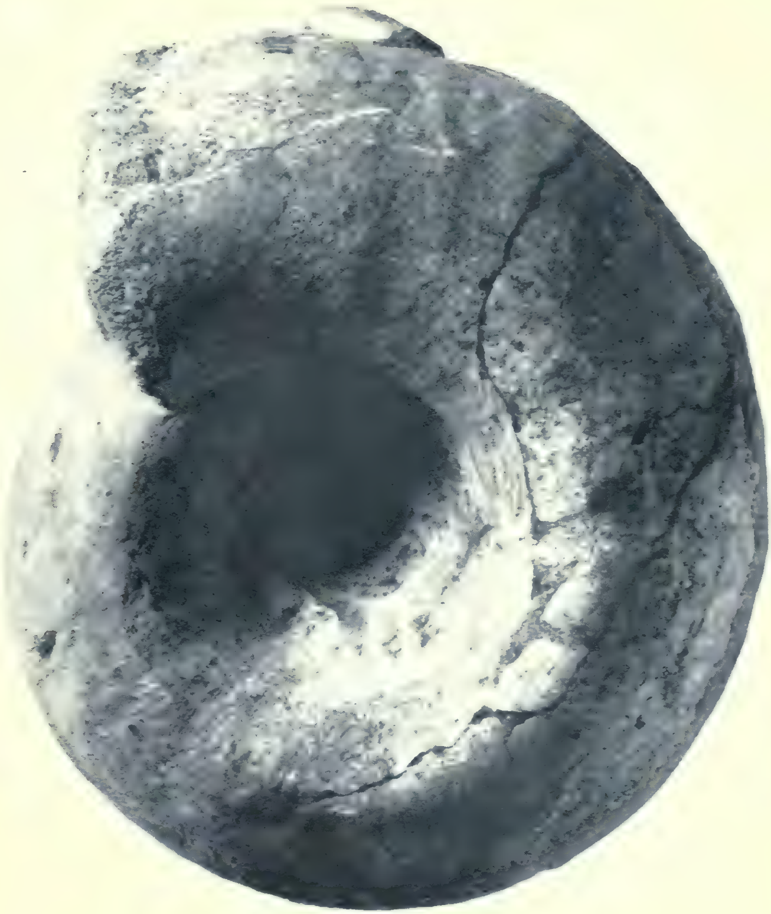
Copy of Protograph

AMMONITES BISULCATA, BRUGUIÈRE. 1798, Paratype
Ency. Méth., Vers I, 28, (protolog), citing Lang, 1708, Hist. lap. XXIV, 1
(Protogr.); p. 95, "Montes Sylvæ Herciniæ circa pagum Bœdmatingen"
T. & F. (Lang), 305 (97), 25, 33, 53 ; ribs 24 ; max. c. 410 +, (550 ?)

AMMONITES BUCKLANDI, J. SOWERBY SP.
Coroniceratan, *bucklandi* ; Genolectotype

HILDOCERAS SERPENTINUM; S. BUCKMAN, 1889, cit. spec.
Geol. Mag. (3). VI. 201 : C. Thompson. 1909, XIII, [2], 214, fig. spec
South Petherton, Somerset ; Up. Lias ; Manchester M., (S.B.), L. 11305
S. 83. 30. 10·5. 44 ; 127. 25. 17. 52 : max. c. 150

HILDAITES SERPENTINIFORMIS, S. BUCKMAN, 1921, III, 55
Harpoceratan, *Hildaites* ; Holotype. See CCXVII



"Cœloceras sp."
"Neighbourhood of Cirencester [Minchinhampton], Gloucestershire"
"Great Oolite" shelly, oolitic; S. B., ex J. B., Coll. 2182
S 77, 37; 85, 35 : 125, 43; 89, 35 : max. c. 1[illegible]

TULITES CADUS, S. BUCKMAN, III 45
Tulitan, *Tulites* (Bathian, *morrisi*); Holotype

" Cœloceras sp."
(" *Stephanoceras* m.f. *coronatum* Schlottheim, Bruguière "
Siemiradzki, 1882. II, 255 ; fig. [2], 256)
[Minchinhampton ; Shelly Beds] ; S.B. Coll. 2182. Cf. CLXIV

TULITES CADUS, S. Buckman, III, 45
Tulitan, *Tulites* (Bathian *morrisi*) ; Holotype

Fig. 1

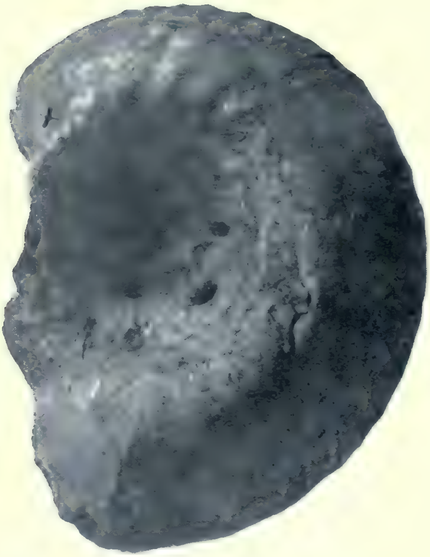


Fig. 2

"AMMONITES SUBCONTRACTUS"
"Near Sherborne, Dorset." [Milborne Wick, Somerset]
"Fullers' Earth Rock" [Milborne Beds]; S.B., ex Darell, Coll. 2760"
S. 53, 36, 63, 34 ; 72, 36, 89, 35 ; max. c. 155

TULITES CADUS, S. BUCKMAN, III, 45
Tulitan, *Tulites* (Bathian, *morrisi*) ; Paratype

Fig. 1

Fig. 2

" AMMONITES SUBCONTRACTUS "

" Near Sherborne, Dorset " [Milborne Wick, Somerset]

" Fullers' Earth Rock " [Milborne Beds] ; S.B., ex Darell, Coll. 1263

S. 56, 38, 63, 37 ? : 80, 40, 73, 35 : 68, 34·5, 40, 38·5 ; size and max. 100

TULITES TULA, S. BUCKMAN, III. 45

Tulitan, *Tulites* (Bathian, *morrisi*) : Genotype, Holotype. See CCLXVIII

Fig. 1

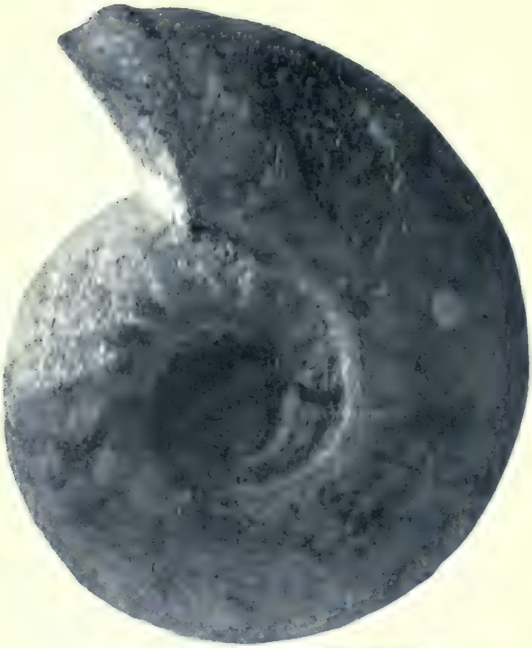
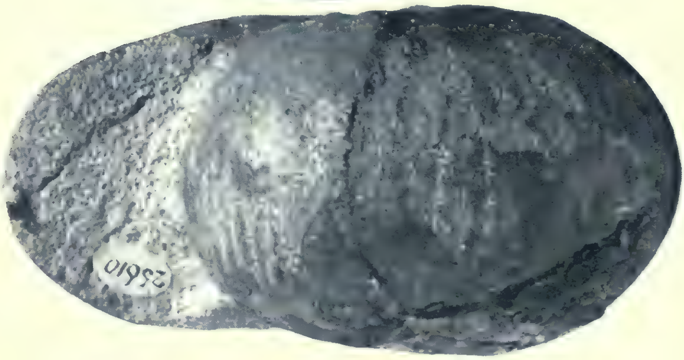


Fig. 2



AMMONITES SUBCONTRACTUS, MORRIS & LYCETT, 1850, Syntype
Moll. G. O., p. 11 (pars) ; Pl. II, f. 1. "Minchinhampton, Glos
"Great Oolite," [Shelly Beds], (shelly, oolitic) ; Geol. Surv. Engl. 25610
S. 49, 37, 80, 34 ; 80, 35, 51, 35 ; max. 90 ; mouth

TULITES SUBCONTRACTUS, MORRIS & LYCETT SP.
Tulitan, *Tulites* (Bathian, *morrisi*) ; Lectotype, III, 45. See CCLXIX

Fig. 2 Fig. 1

Ammonites subcontractus, Morris & Lycett, 1850, Syntype
Moll. G.O. p. 11 (dimensions) ; Pl. ii, f. 1*a* (pars) ; " Minchinhampton"
Geol. Surv. Engl. 25615 ; S. 76, 41, 82, 30·5 ; 123, 36, 57, 33
Max. c. 130. Fig. 2, from squeeze of umbilicus

MADARITES MADARUS, S. Buckman, III, p. 46
Tulitan, *Madarites* (Bathian, *subcontractus*) ; Genotype, Holotype

AMMONITES SUBCONTRACTUS, MORRIS & LYCETT, 1850, Syntype
"Minchinhampton, Glos; Great Oolite" [below Shelly Beds]
Matrix hard, greyish-fawn coloured, non-oolitic limestone
Geol. Survey Engl. Coll. 25615. Cf. CCLXVIII

MADARITES MADARUS, S. BUCKMAN, III, 46
Tulitan *Madarites* (Bathian, *subcontractus*); Genotype, Holotype

× 0·62

AMMONITES BULLATUS ; LYCETT, 1863, Fig. Spec.
Moll. G.O., Sup., 4 ; XXXI. 1 ; "near Tiltups Inn, Nailsworth, Glos
"Great Oolite" ; Geol. Surv. England (Lycett Coll.), 25620
S. 100, 48. 53 +, 10 ; 170. 34. 33. 39 ; max. 183. R. restored

BULLATIMORPHITES BULLATIMORPHUS, S. BUCKMAN, III, 47
Tulitan, *Bullatimorphites* (Bathian, *morrisi*) ; Genotype, Holotype

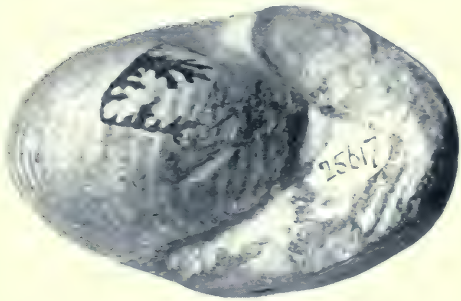
× 0·83

Ammonites bullatus; Lycett, 1863 Fig. spec.
Moll. Great Oolite, Supplement p. 4; Pl. xxxi, fig. 1
"Near Tiltups Inn, two miles south of Nailsworth, Gloucestershire
"G. O." a whitish, weathering ochre, hard cryst. limest., feebly oolitic

BULLATIMORPHITES BULLATIMORPHUS, S. Buckman, III, 47
Tulitan, *Bullatimorphites* (Bathian, *morrisi*); Genotype, Holotype

Fig. 1

Fig. 2



AMMONITES MACROCEPHALUS, var., MORRIS & LYCETT, 1850, Fig. spec. Moll. G.O. 12 : II. 3 ; *Am. morrisi*. Oppel, 1857, Juraf. 478. Holotype "Near Minchinhampton ; G.O." ; "base of," Lycett, Sup., Id., 1863, 121 G.S.E., (Lycett Coll.), 25617 ; S. 61, 45, 66, 15 ; max. c. 85 + ; III, p. 49

MORRISITES MORRISI, OPPEL SP.

Tulitan, *Morrisites* (Bathian, *morrisi*) ; Genotype, Holotype. Cf. CLXVII

Fig. 2

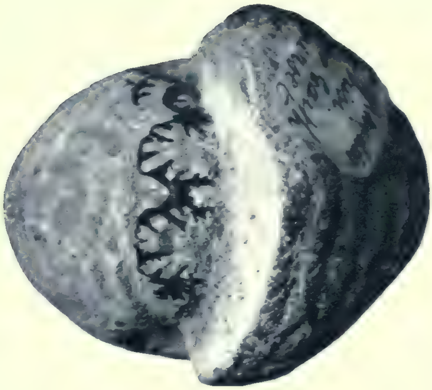
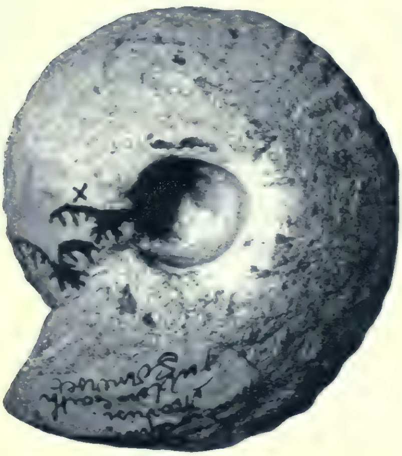


Fig. 1



"Macrocephalites morrisi"
"Somerset; Fullers' Earth [Rock]," cream col., somewhat ironshot
J.W.T. Coll.; S. 44, 41, 73, 25; 59, 49, 79, 21
Size 63 mm.; max. c. 70. See CLXVII

MORRISICERAS KORUSTES, S. Buckman, III, p. 48
Tulitan, *Morrisiceras* (Bathian, *morrisi*); Holotype

Fig. 2

Fig. 1

Fig. 3

AMMONITES SUBLÆVIS, J. SOWERBY, 1814. Chorotype
M.C. I, 117; LIV, S.E. fig., lectot. by exclus., cf. Eudes Deslong. 1886, 26
"Kellaway[illegible]s, Wiltshire: Kell. Rock (e [illegible])"; J. W. Tutcher Coll.
S. 47, 40, 58, — : 65, 30, 8[illegible], 25·5; 27 ribs. Cf. CCLXXIV

CADOCERAS SUBLÆVE, J. SOWERBY sp.
Proplanulitan, *Crassiplanulites* (Callovian, *calloviense*)

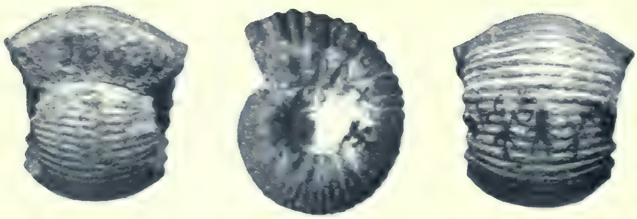
Fig. 1

Fig. 2

"Ammonites dimorphus d'Or.," Wright
Lab. Wright's holograph. [Half-way House, Compton, Dorset]
[I.O., blue beds]; S.B. Coll. 909, purch. ex Wright Coll.
S. 40, 34, 62, 35; 52, 33, 52, 41; 66, 29, 40, 46; max. 69

DOCIDOCERAS BIFORME, nov.
Sonninian, *Eudmetoceras* (Bajocian, *discites*); Holotype. See CCLXIV

Fig. 2 Fig. 1 Fig. 3

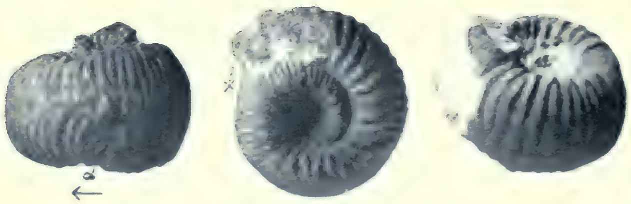


× 1·5

A cadicone phaulomorph
Bradford Abbas, Dorset ; Inf. Ool., Foss. Bed [middle]
S.B. Coll. 3092 ; S. 10·5, —, 108, — ; 18·5, 36·5, 90, 32·5. See CXL

TRILOBITICERAS PLATYGASTER, nov.
Sonninian, *Eudmetoceras* (Bajocian, *discites*) ; Holotype

Fig. 2 Fig. 1 Fig. 3



A dysmorph contracticone
Bradford Abbas, Dorset, Inf. Ool., Foss. Bed [middle]
S.B. Coll. 3093 ; S. 18·5, 36·5, 87, 36·5 ; 25, 28, 56, 44
See CXL ; *d*, dysmorphy

TRILOBITICERAS PLATYGASTER, nov.
Sonninian, *Eudmetoceras* (Bajocian, *discites*) ; Paratype

Fig. 1

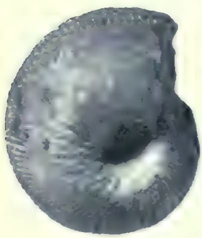
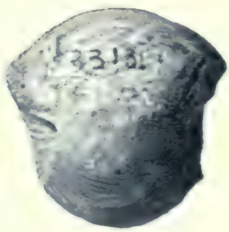


Fig. 2



A coronate Sphæroceratid
Dundry, Somerset ; Inf. Oolite, Ironshot Bed [base]
S.B. Coll. 3313 ; S. (18·5, 43, 98, 18) ? ; 30·5, 40, 96, 18. See CCXIV

LABYRINTHOCERAS GIBBERULUM, NOV.
Sonninian, *Labyrinthoceras* (Bajocian, *sauzei*) ; Holotype

Fig. 1

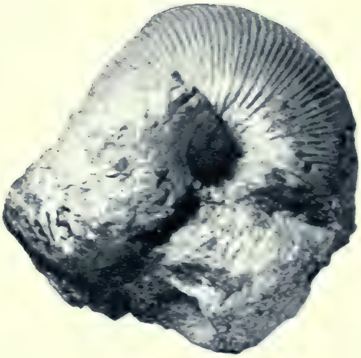
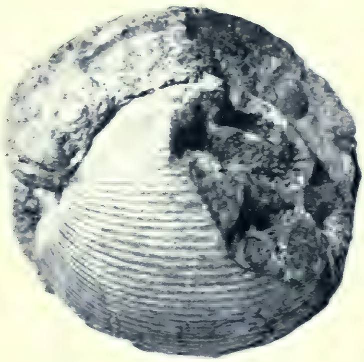


Fig. 2



" Ammonites brongniarti "
" Dundry, Somerset ; Inf. Ool.," [White Ironsh./Ironshot]
S.B., ex. T. Stock, Coll. 3315 ; S. 35, 48, 106, 13
S. 48, 41·5, 104, 14. Max. c. 65. See CCLXXVIII

LABYRINTHOCERAS AMPHILAPHES, nov.
Sonninian, *Labyrinthoceras* (Bajocian, *sauzei*) ; Holotype

Fig. 1

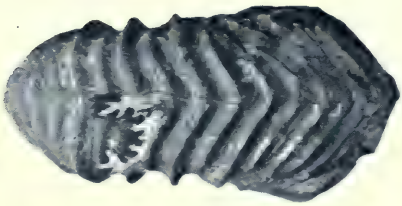


Fig. 2

AMMONITES VERTUMNUS
"St. Ives, Hunts; Oxf. Clay," grey argillaceous matrix
J.W.T. Coll. S. 51, 44, 49 (43), 33; max. c. 55. See CCLX

SAGITTICERAS FASTIGATUM, S. Buckman, 1920, III, p. 10
Cardioceratan, *Sagitticeras* (Argovian, pre-*Goliathiceras*); Holotype

Fig. 1

Fig. 2

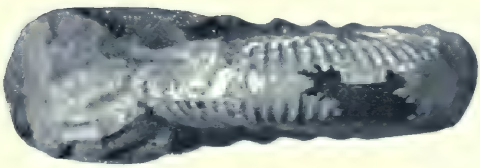
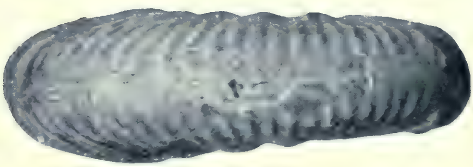


Fig. 3



AMMONITES KOENIGI, J. SOWERBY, 1820, Topotype ?
(Min. Conch. III, 113 ; CCLXIII, 3) ; " Rampisham, Dorset
" Oxf. Cl." Kell. Cl. (*a*) ; Geol. Surv. Engl., ex Darell Coll., 7688
S. 57, 41, 33 (30), 30 ; 18 ribs ; size 66 mm. ; max. c. 108, III, p. 36

PROPLANULITES KOENIGI, J. SOWERBY SP.
Proplanulitan, *majesticus* (Callovian, *koenigi*). See CCLII

Fig. 2

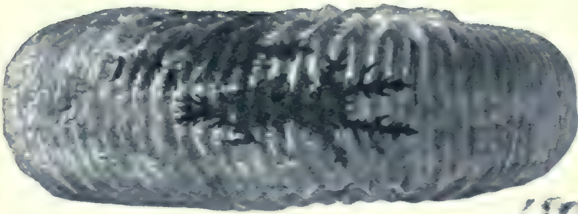


Fig. 2a

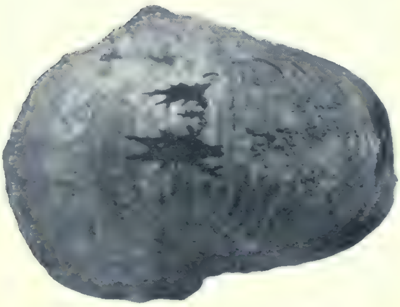
Fig. 1

AMMONITES BIPLEX, J. SOWERBY
Headington Quarry, Oxfordshire ; Corallian, [Shell Bed]
Magdalen Coll. Pit, "top of lowest course," Quarryman ; S.B. Coll. 3555
S. 57. 32. 30. 42 : 86·5. 33·5. 31·5. 42·5 : 40 ribs ; size 96

PERISPHINCTES BIPLEX, J. SOWERBY SP. 1821. See III, 27
Perisphinctean, *martelli* (Argovian, *martelli*). Cf. CXXXIX

Fig. 1

Fig. 2



MACROCEPHALITES cf. ARCTICUS, NEWTON
"South Cave, S. Yorks; Kellaways Rock," siliceous, ironshot
Mr. Frank Petch Coll.; S. 33, 45, 72, —; 44, 45·5, 65, 22 + —
Size 51; ribs 22; max. c. 55. Fam. Macrocephalitidæ, nov.

CATACEPHALITES DURUS, nov.
Macrocephalitan, *Catacephalites*; Genotype; Holotype. Cf. CCLXXIII

× 0·96

" MACROCEPHALITES GRANTANUS "
[Chippenham Wiltshire ; lowest Kell. Clay], light blue clay
J.W.T. Coll. S. 82, 42·5, 76, 23 ; 114, 44, 63, 28
Ribs 39 ; max. c. 120. Fam. Macrocephalitidæ

PLEUROCEPHALITES LOPHOPLEURUS, NOV.
Macrocephalitan, *Pleurocephalites* ; Genotype, Holotype

× 0·96

" MACROCEPHALITES GRANTANUS "
[Chippenham, Wiltshire]; light blue clay
J. W. Tutcher Coll. S. 114, 44, 63, 28. Cf. CCLXXXIII

PLEUROCEPHALITES LOPHOPLEURUS, NOV.
Macrocephalitan (Callovian, *pre-majesticus*)

Fig. 2a

Fig. 1

Fig. 2

" Macrocephalites morrisi "
" Shepton Montague, Somerset ; Fullers' Earth Rock "
Greyish ochre, somewhat shelly stone ; J.W.T. Coll.
S. 51, 50·5, 69·5, (4 ?) ; 91, 40, 45, 23 ; max. c. 95

MORRISICERAS COMMA, nov.
Tulitan, *Morriceras* ; Holotype. See CCLXXIV

Fig. 1

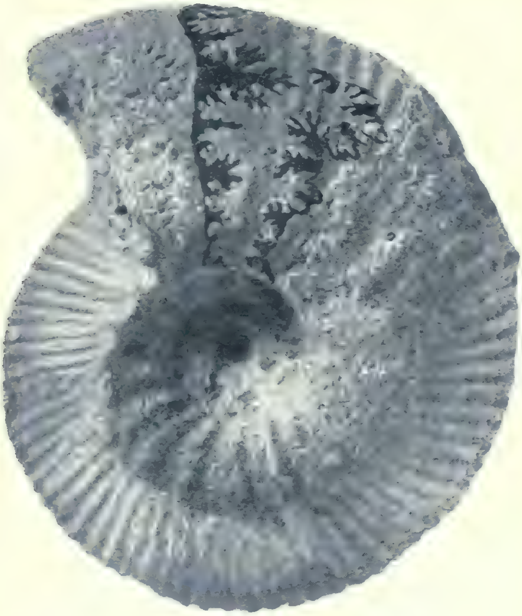
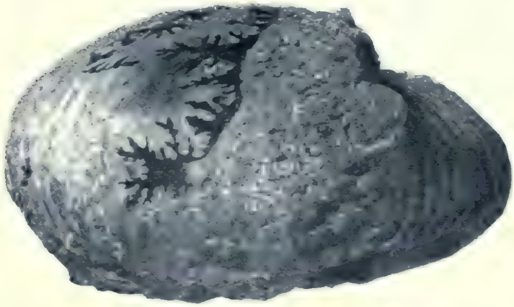


Fig. 2

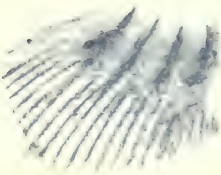


" AMMONITES MACROCEPHALUS " ; KEPPLERITES, S.B., 1921
III, 54 ; (near Witney, Oxon ; Middle] " Cornbrash," calcareous
Shelly, iron-specked and stained ; Univ. Coll. Nottingham (Dr. Codd C.)
S. 49, 44, 57, 23·5 ; 84, 44, 52, 22·5 ; max. c. 125 ; Kosmoceratidæ

CERERICERAS CEREALE, nov.
Macrocephalitan, *Cerericeras* ; Genotype, Holotype

Fig. 1

Fig. 1b



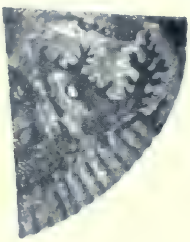
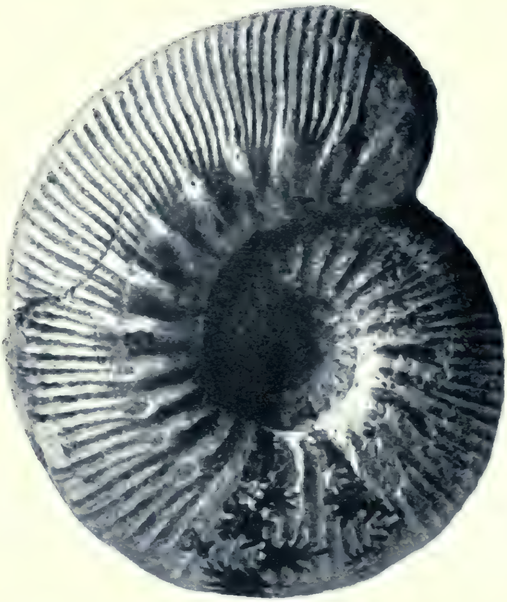


Fig. 1a

AMMONITES GOWERIANUS
" Brora, [Sutherland], Roof of the Coal " ; G.S.E. (ex Geol. Soc.), 7188
S. 61, 41, 52, 30 ; 86, 37, 44, 32 ; max. c. 95
[The holotype of *A. gowerianus* is in British Mus. (N.H.), 43917]

GOWERICERAS PLANUS, NOV.
Proplanulitan, *majesticus* ; Holotype. See CCLIV



" AMMONITES GOWERIANUS "
[Chippenham], " Wiltshire " ; Oxf. Cl. " [Kellaways Clay (a)]
Geol. Surv. Engl., 30460 ; S. 47, 38, 55, 30 ; 61, 43, 52, 29·5
S. 80, 34, 41, 37·5 ; max. c. 85. See CCLXXXVII

GOWERICERAS VENTRALE, NOV.
Proplanulitan, *majesticus* ; Holotype

Fig. 1

Fig. 2a Fig. 2

AMMONITES KEPPLERI, OPPEL, 1862, Syntype
Pal. Mitth. III, Ceph., p. 151. "Ehningen bei Pfullingen,"
"Wurttemberg; Kelloway Gruppe, z. *Am. macrocephalus*"
S. 67, 50, 52, 18; 20 ribs; 116, 41, 44, 23; (130, 39? 41·5? 30)

KEPPLERITES KEPPLERI, OPPEL SP. (lectotype? T.A. III, p. 54)
Macrocephalitan, *Kepplerites* (Callovian, *macrocephalus*); Genolectotype

Fig. 1

Fig. 2

Fig. 2a

AMMONITES KEPPLERI, OPPEL, 1862, Syntype
" Original ex. pag. [151] Ehningen," written on specimen
" Kell. Gr., z. *Am. macroceph.* ; matrix, dark, hard, limonitic
Pal. Mus., Munich (Oppel Coll.) ; max. c. 180 ; *d.l.*, relics, dorsal lobes

KEPPLERITES KEPPLERI, OPPEL SP.
Macrocephalitan, *Kepplerites*. Cf. CCLXXXVII

Fig. 3

Fig. 1a

Fig. 1

Fig. 4

Fig. 5

Fig. 2

AMMONITES GALILAEII, OPPEL, 1862, Holotype
III, 152; "Chippenham; Kell." [R. base], grey grit, Lam., Gastr.
Clay lump, in b. ch.; Munich Mus.; in whorls, lat. orn. 5**
S. 27, 44, 44, 26; 52, 42, 46, 25; 85, 42, 49, 25; max. c. 125
(Fig. 5, Macrocephalite (S. 35, 48, 40, —)?; *i.w*, in. whorls displaced)

GALILAEICERAS GALILAEII, OPPEL SP.
Proplanulitan, *Galilaeiceras*; Genotype. Cf. CCLXXXIX

Fig. 1

Fig. 2a

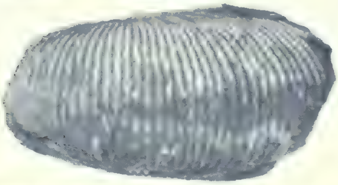
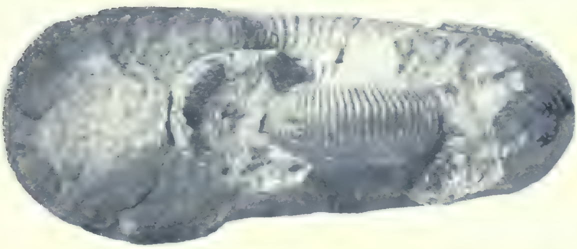


Fig. 2



AMMONITES GOWERIANUS ; H. B. WOODWARD, 1895, cit. spec.
Mid. Ool. Engl. ; Mem. Geol. Surv. V. 30 ; " S.W. of Little Somerford,
" Malmesbury, Wilts ; Kell. Rock [e] " ; Geol. Surv. Engl. 4745
S. 42, 46, 45, 28·5 ; 79, 42, 41, 28 ; max. c. 85

GALILAEICERAS TRICHOPHORUM, nov.
Proplanulitan, *Crassiplanulites* ; Holotype. See CCXC

Fig. 2

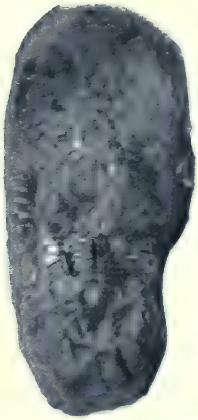
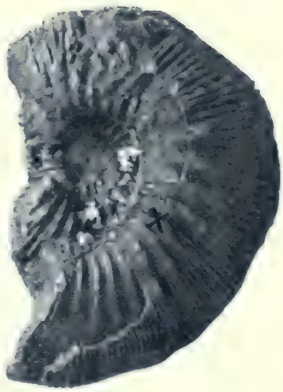


Fig. 1



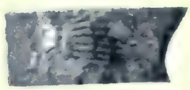


Fig. 2a

AMMONITES TORICELLII, OPPEL, 1862, Syntype
Pal. Mitth. III, 153 ; " Ehningen, Württemberg ; Kell. Gruppe
Z. *Am. macroceph.* " ; brownish marl, ironshot ; Pal. Mus. Munich
S. 29, 43, 46·5, 31 ; 51, 39, 43, 33 ; c. 28 ribs ; max. c. 65

TORICELLICERAS TORICELLII, OPPEL SP.
Macrocephalitan, *Kepplerites* ; Genotype, Lectotype. Cf. CCXCI

Fig. 1

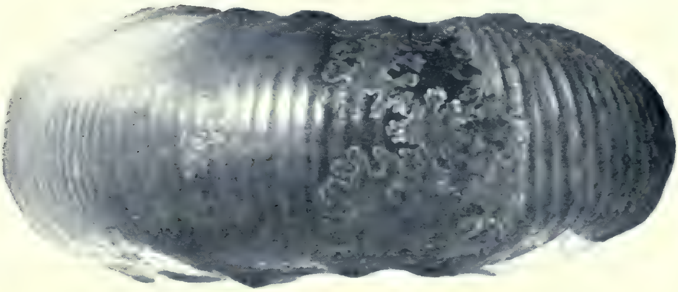
Fig. 2

" AMMONITES GOWERIANUS "
[Kellaways,] " Wiltshire ; Kellaways Rock ; hard, blue quartz grit
Geol. Surv. Engl. (" pres. Earl of Enniskillen "), 25692
S. 67, 44, 49, 24 ; 112, 34·5, 46, 34·5 ; max. 112

GALILAEANUS CRUCIFER, nov.
Proplanulitan, *Crassiplanulites* ; Genotype, Holotype. Cf. CCXC

Fig. 1

Fig. 2



"AMMONITES GOWERIANUS"
Kellaways, Wilts; Kell. R. (brown, with *Ornithella* in b.-ch.)
Geol. Surv. Engl. 25691; S. 60, 38, 42, 27
S. 81, 42, 40, 30; S. 104, 30, 34·5, 38·5; max. c. 135?

GALILAEITES CURTILOBUS, nov.
Proplanulitan, *opimus*; Genotype, Holotype. Cf. CCXCIII

Fig. 3 Fig. 2 Fig. 1

AMMONITES CHALCEDONICUS
Horspath, near Oxford ; Lower Calcareous Grit, [upper part]
S.B. Coll. 3601, loose on stone heap ; S. (312, —, 45, —) ? ; max. c. 410
(Fig. 3, Synthetograph s.l., CCXCV A + B + surmise)

CHALCEDONICERAS CHALCEDONICUM, YOUNG & BIRD sp.
Cardioceratan, *Vertebriceras* ; Genotype. Cf. CLVI

Fig. 1a

Fig 1

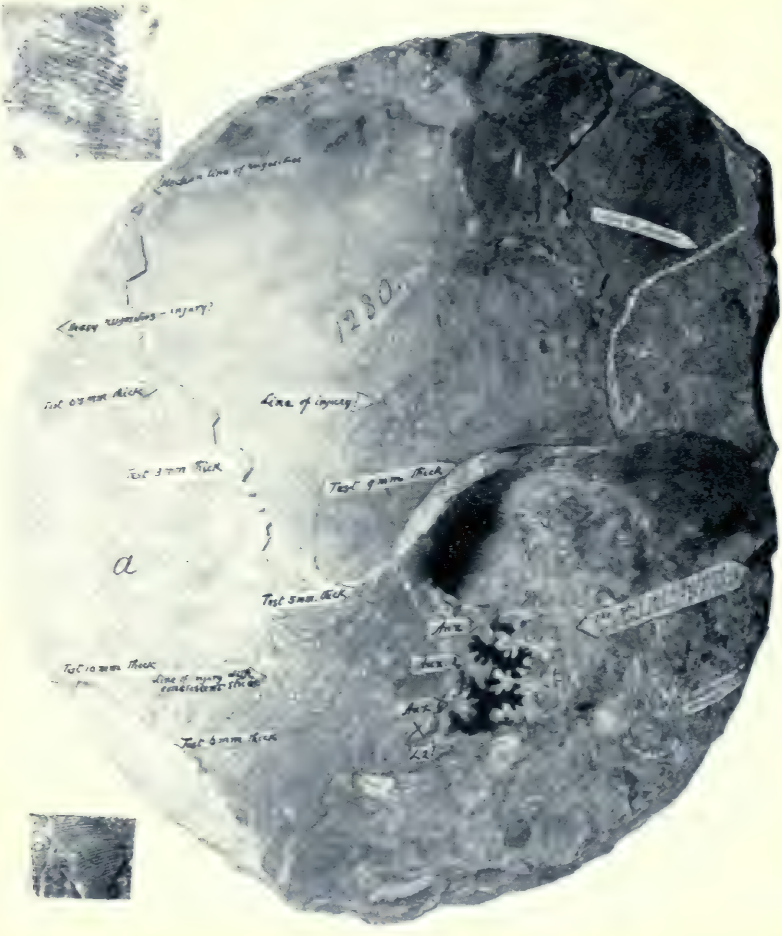


Fig. 1b

× 0·34

NAUTILUS CHALCEDONICUS, YOUNG & BIRD, 1828, Holotype
"Oolite, Thornton, Yorkshire; Mr. Wm. Clark [Scarborough]"
Whitby Museum 1280; S. 205, 52, 46 (17)
S. 208, 56, 46, 12; 353, 50, 36, 18·5

CHALCEDONICERAS CHALCEDONICUM, YOUNG & BIRD SP.
Cardioceratan, *Vertebriceras*

× 0·37

Nautilus chalcedonicus, Young & Bird, 1828, Holotype
Geol. Yorks. 271, 272 ; " Thornton, Yorkshire ; [Corallian] Oolite "
Hard blue-grey limest. (" Mid. Calc. Grit, Hard blue rock "
Blake & Hudl., Q.J.G.S. XXXIII, 342, § —, Bed [5]) ; Whitby Mus. 1280

CHALCEDONICERAS CHALCEDONICUM, Young & Bird sp.
Condioceratan, *Vertebriceras*

Fig. 1 Fig. 2

AMMONITES GOLIATHUS
Horton Brickyard, Horton-cum-Studley, Oxfordshire
Up. Oxf. Cl., near surface ; limonitic cast ; S.B. Coll. 3498, purch.
S. 30, 43, 37, 23·5 : 55, 46·5, 58, 27 ; max. c. 130 ?

HORTONICERAS SIDERICUM, nov.
Cardioceratan, *cardia* ; Genotype, Holotype. Cf. CLVI

Fig. 1

Fig. 3

Fig. 2

Ammonites putealis, Leckenby, 1859, Holotype
Q.J.G.S. XV, 11 ; II, 3 ; " The Castle Rock, Scarborough, Yorkshire "
(" Near Gristhorpe Bay," lab. on spec.) ; " Kell. R.," grey, few large ool.
Sedg. Mus., Cambr. ; S. 38, 39, 33, 33 ; max. c. 45. Ribs 5**

PUTEALICERAS PUTEALE, Leckenby sp.
Vertumniceratan, *vertumnus* ; Genotype

An alticarinate Sonninia
[Sandford Lane], " near Sherborne, Dorset, Inf. Ool."
[Foss. Bed, top part]; S.B., ex Darell Coll., 1093
S. 63, 41, 31, 31 ; 126, 43, 25, 29 ; max. c. 180

SONNINIA PROPINQUANS, Bayle sp., 1878
Sonninian, *sauzei*. Cf. CL

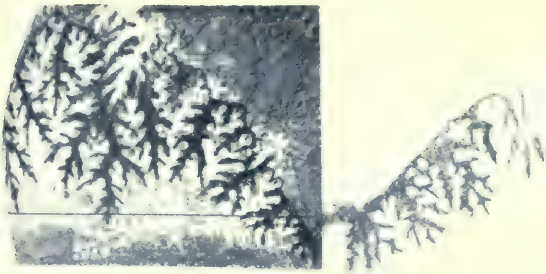


Fig. 3

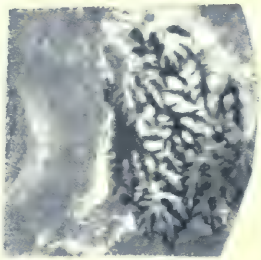


Fig. 2a
reversed

Fig. 2
dorsal
lobes

Fig. 1

HAMMATOCERAS AMALTHEIFORME ; S. BUCKMAN, 1889, cit. spec.
Q.J.G.S. XLV, 661 ; Bradford Abbas, Dorset
Inferior Oolite, *concavum* zone ; S.B. Coll. 568
S. 65, 42, 31. 29 ; 122, 48, 22, 22 ; max. c. 165

EUAPTETOCERAS EUAPTETUM, NOV.
Sonninian, *Eudmetoceras* ; Genotype, Holotype. Cf. CCLXXIX

Fig. 1a

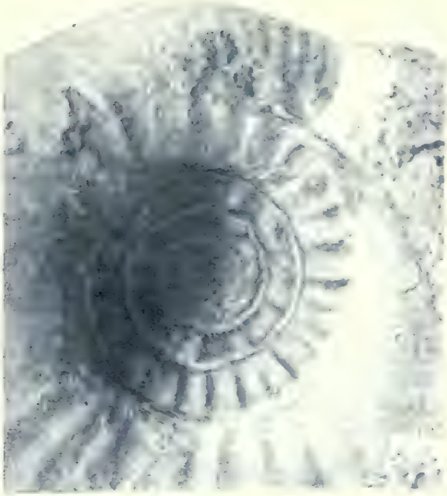


Fig. 2

Fig. 1

STEPHANOCERAS CRASSIZIGZAG
" [Grange Quarry], Broad Windsor, Dorset; I.O. [top beds]"
S.B., ex Darell, Coll. 1157; S. 65, 36, 49, 40
S. 108, 35, 46, 34; max. c. 195. See CCLIX

ZIGZAGICERAS RHABDOUCHUS, NOV.
Zigzagiceratan, *pollubrum*; Holotype

Fig. 1

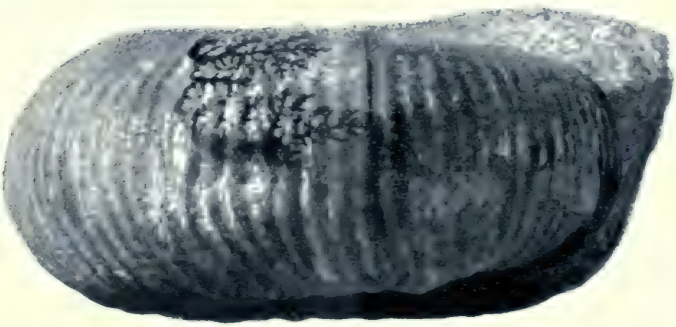


Fig. 2

STEPHANOCERAS CRASSIZIGZAG
Broad Windsor, Dorset ; S.B., ex Darell, Coll. 1157
Fig. 1. Secondary ribs appear to break up into costulæ

ZIGZAGICERAS RHABDOUCHUS, NOV.
Zigzagiceratan. *pollubrum* ; Holotype

Fig. 1

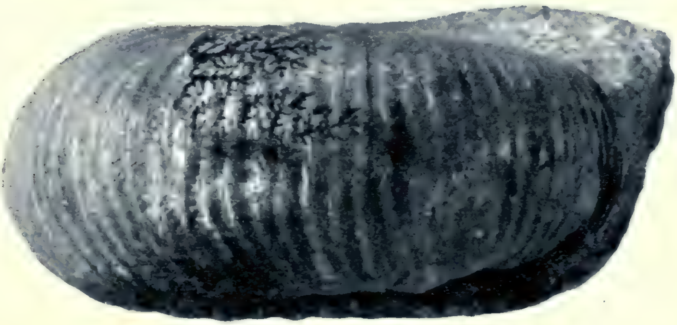


Fig. 2

STEPHANOCERAS CRASSIZIGZAG

Broad Windsor, Dorset ; S.B., ex Darell, Coll. 1157

Fig. 1. Secondary ribs appear to break up into costulæ

ZIGZAGICERAS RHABDOUCHUS, NOV.

Zigzagiceratan, *pollubrum* ; Holotype

Fig. 1 × 0·75 Fig. 2 × 0·83

"ZIGZAGICERAS cf. MOOREI; NEUMAYR SP."
"Ry. N. of Troy Farm, Fritwell, [Oxon], Bed 20 (k 1)," [*wagneri*]
(Brach. Nam.; Pal. Ind., N.S., III (2), 1918, 236); G. S. Engl. 30328
S. 123, 37·5, 36, 33·5; 190, 35·5, 33, 37; c. 35 ribs; max. c. 330

ZIGZAGITES IMITATOR, NOV.
Zigzagiceratan, *imitator*; Genotype, Holotype. Cf. CCC

Fig. 2a N.S. Fig. 1 × 0·72

Fig. 2 × 0·6

ZIGZAGICERAS SP., L. RICHARDSON, 1910, cit. spec.
Proc. Geol. Assoc. XXI, 426, § [1], 1, "top; Combe Hay, Bath
"Fullers' E., *Ostrea knorri*"; Geol. Surv. E. (L. R. Coll.) 26985
S. 126, 38, 33, 32·5; 30 ribs; S. 185, 37, 28, 35; max. c. 250

PARKINSONITES FULLONICUS, NOV.
Zigzagiceratan, *fullonicus*; Genotype, Holotype. Cf. CCCI

Fig. 2a N.S.

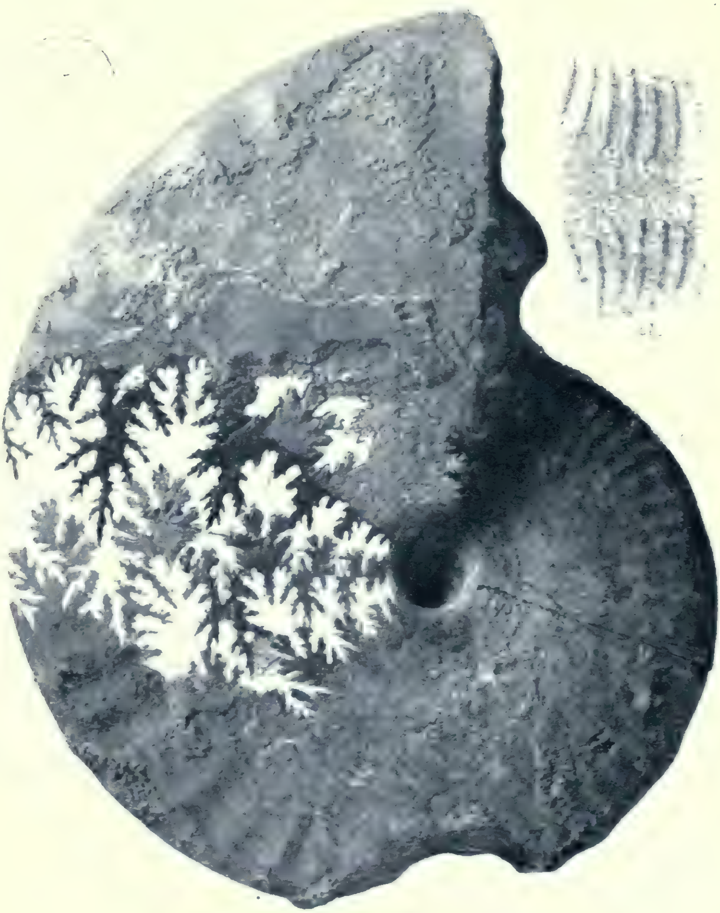
Fig. 1 × 0·72

Fig. 2
× 0·0

Zigzagiceras sp., L. Richardson, 1910, cit. spec
Proc. Geol. Assoc. XXI, 426, § [I], l, " top ; Combe Hay, Bath
" Fullers' E., *Ostrea knorri* " ; Geol. Surv. E. (L. R. Coll.) 26985
S. 126, 38, 33, 32·5 ; 30 ribs ; S. 185, 37, 28, 35 ; max. c. 250

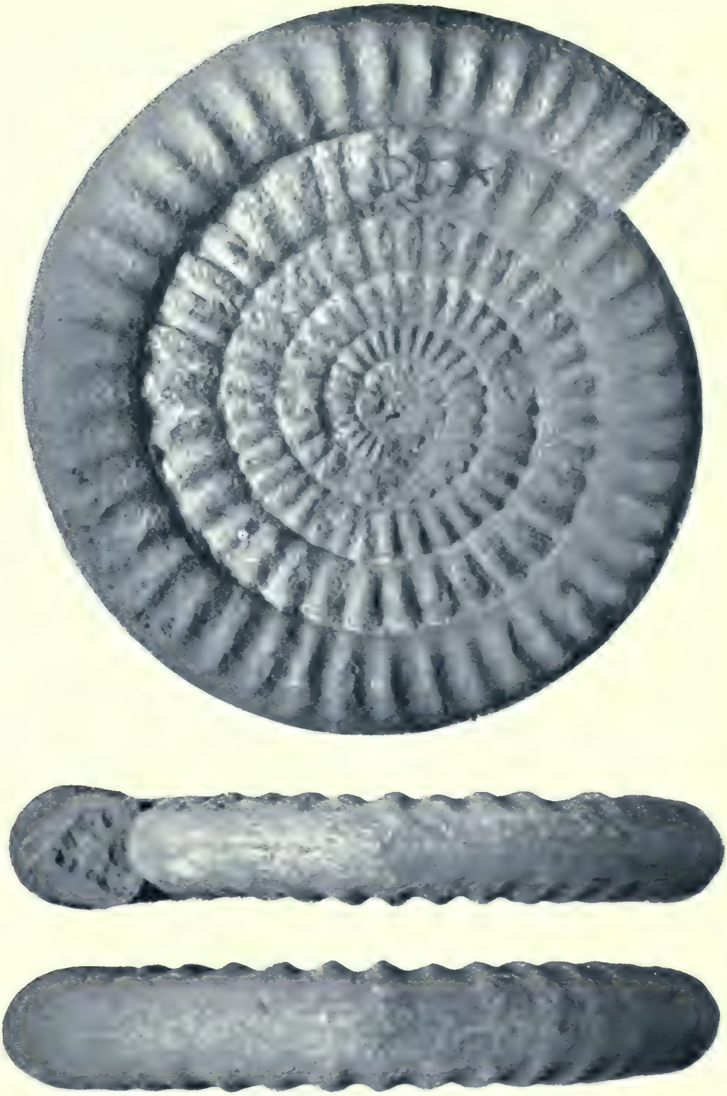
PARKINSONITES FULLONICUS, nov.
Zigzagiceratan, *fullonicus* ; Genotype, Holotype. Cf. CCCI

Fig. 2 Fig. 1 Fig. 2a



Oppelia præradiata
Stoford ; Somerset ; I.O., *sauzei* (Q.J.G.S. XLIX, 1893
P. 484, §1, 10) ; S.B. Coll. 3054 ; S. 121, 57, 24·5, 10·5
Max. c. 335 ; mark of nearly another whorl

AMBLYOXYITES AMBLYS, nov.
Sonninian, *sauzei* ; Genotype, Holotype



"Caloceras johnstoni"
"Radstock Grove, Radstock, Som.; Lower Lias, *johnstoni* z."
J. W. Tutcher Coll.: S. 70, 18, 17 +, 63
S. 100, 16·5, 17, 67·5: max. c. 103. See XVII

CALOCERAS PIRONDII, Reynès sp. 1879
Caloceratan, *johnstoni*; (Reynès, III, 29, 30, lectotype)

× 0·10

Ammonites giganteus
Haddenham, Bucks; Portlandian, Glauc. Stone Bed
S.B. Coll. 3410, pres. Mr. Spencer Jackson
S. 607, 33, 27, 45; c. 60 ribs; b.-ch. with mouth

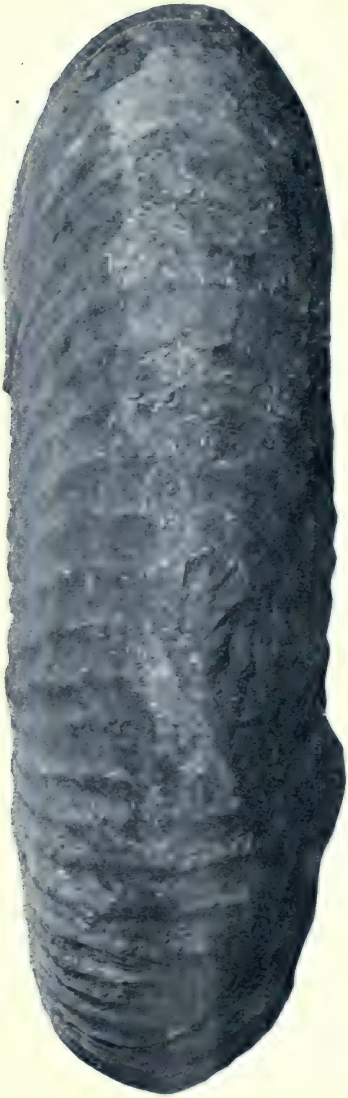
BEHEMOTH MEGASTHENES nov.
Behemothan. *megasthenes*; Genotype, Holotype. Cf. CCLVII

× 0·10

AMMONITES GIGANTEUS
Haddenham, Bucks; Portlandian, Glauc. Stone Bed
S.B. Coll. 3410, pres. Mr. Spencer Jackson
S. 607, 33, 27, 45; c. 60 ribs; b.-ch. with mouth

BEHEMOTH MEGASTHENES nov.
Behemothan, *megasthenes*; Genotype, Holotype. Cf. CCLVII

× 0·26



Ammonites giganteus
Haddenham, Bucks; Works N. of Station, floor of engine-house
Hard stone with green specks, cf. Glauc. St., Long Crendon
S.B. Coll. 3410; S. 390, 32, 28, 45; 44 ribs; max. 607

BEHEMOTH MEGASTHENES, S. Buckman
Behemothan, *megasthenes*; Genotype, Holotype. Cf. CCLVII

× 0·46

AMMONITES BONONIENSIS
Long Crendon, (N.W. end), Bucks ; Portl., Glauc. Stone
S.B. Coll. 3662 ; S. 165, 32, 40, — ; 271, 33, 35, 48
Max. c. 475 ; EL, 67, L1, 79, L2, 56 per cent. at 66 mm.

GLAUCOLITHITES GLAUCOLITHUS, NOV.
Behemothan, *glaucolithus* ; Genotype, Holotype. Cf. CCCV

× 0·56

Ammonites bononiensis
Long Crendon (N.W. end), Bucks; Portlandian
"The Stone Bed, Building Stone," Glauconitic, hard stone
Partly green, partly blue, $2\frac{1}{2}$—3 ft. thick; S.B. Coll. 3662

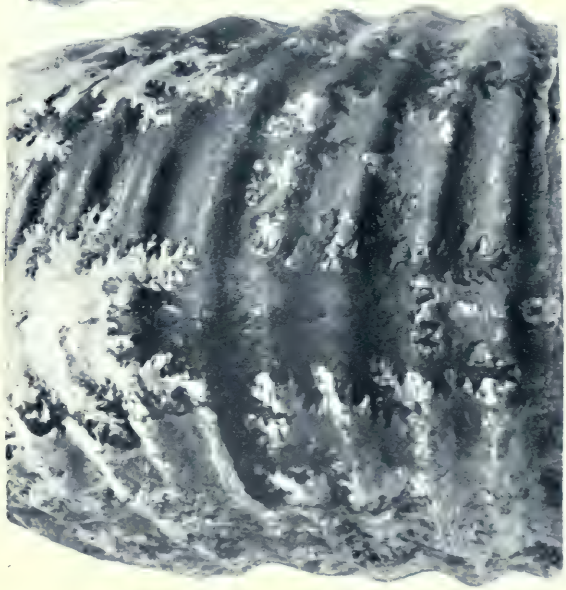
GLAUCOLITHITES GLAUCOLITHUS, S. Buckman
Behemothan, *glaucolithus*; Genotype, Holotype. Cf. CCCV

AMMONITES BONONIENSIS
Long Crendon (N.W. end), Bucks; Portl., Glauc. Marl
S.B. Coll. 3503, pres. Mr. A. J. Webb; S. (244, 30, 34, 47)
Max. c. 425; EL. 50, L1, 54, L2, 33 per cent. at 66 mm.

LEUCOPETRITES LEUCUS, NOV.
Behemothan, *leucus*; Genotype, Holotype; Cf. CCCVI

Fig. 2

Fig. 1



AMMONITES BONONIENSIS
Long Crendon (N.W. end), Bucks; Portlandian
"Rubbly Beds," "Green Bed," Glauconitic Marl
Caps the Glauconitic Stone Bed; S.B. Coll. 3503

LEUCOPETRITES LEUCUS, S. BUCKMAN
Behemothan, *leucus*; Genotype, Holotype; Cf. CCCVI

Fig. 2 × 0·91

Fig. 1 × 0·91

AMMONITES BIPLEX

Sandpit near Waterworks, Shotover, Oxford ; Shotover Grit Sands
Dogger c. 20 ft. down ; S.B. Coll. 2944 ; max. c. 220
S. 168, 33, 32, 46 ; c. 33 ribs ; EL. 31, L1. 31, L2. 20 at 34 mm.

PARAVIRGATITES PARAVIRGATUS, nov.
Paravirgatitan, *paravirgatus* ; Genotype, Holotype. Cf. CCCVII

Fig. 1

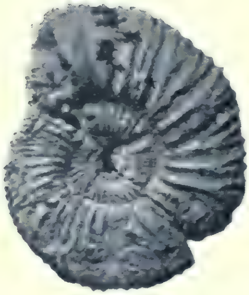


Fig. 2

AMMONITES BIPLEX
[Swindon, Wilts: Portlandian: Lydite Bed, brown. Lower L.B.]
J. W. Tutcher Coll.; S. 24, 34, 34, 36; 37·5, 33, 33·5, 36
Ribs 31; size c. 40; EL, c. 42, L1, c. 32, L2, c. 24 at 12·5 mm.

PARAVIRGATITES PARAVIRGATUS, S. BUCKMAN
Paravirgatitan, *paravirgatus*

Fig. 1

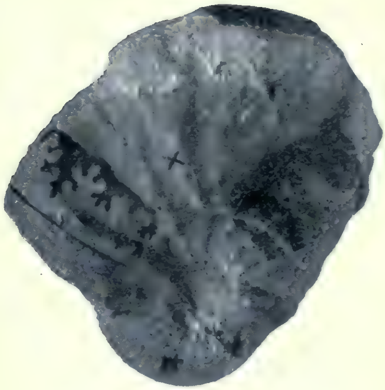


Fig. 2a

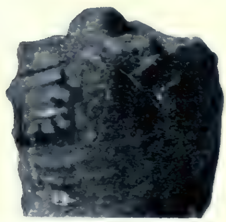
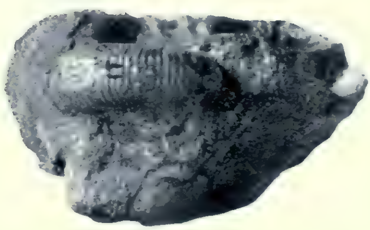


Fig. 2



AMMONITES GOWERIANUS, LECKENBY, 1859, Plesiotype
Q.J.G.S. XV, 9 ; 1, 1b–d ; Scarborough, Yorks ; Kell. R.
Brown sandst., drab and cream ool. gr. ; Sedg. M., Cambridge
S. 22, 43, 45, 34 ; 30, 40, 43, 30 ; 55, 39, 43, 33 ; size 55 ; max. c. 77

GALILAEITES INDIGESTUS, NOV.
Proplanulitan, *opimus* ; Holotype. See CCXCII

Fig. 1a × 2

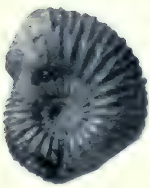


Fig. 2

Fig. 3

Fig. 1

AMMONITES TORICELLII, OPPEL, 1862, Syntype
Pal. Mitth., III, 153, " Ehningen, Würt. ; Kell. Gr., z. *Am. macroc.*"
Brown hard marl, limonitic ; Pal. M., Munich (Oppel Coll.)
S. 14, 36, 45, 34 ; 23, 37·5, 37·5, 35 ; 25 ribs ; max. c. 31
Lat. orn. 1, 5*, 5**, 5* ; venter subsulc., costate, edges tuberc.

TORICELLICERAS SUBSULCATUM, NOV.
Macrocephalitan, *Kepplerites* ; Holotype. See CCXCII

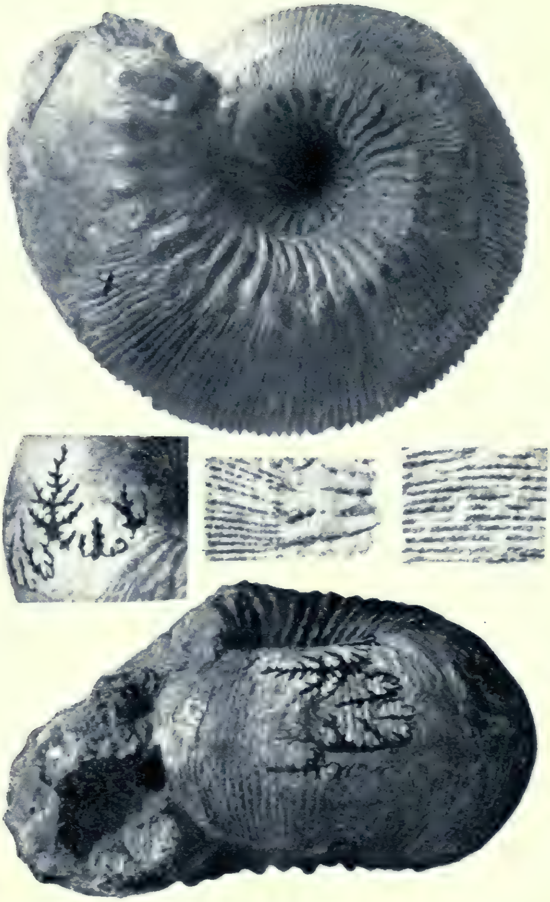


Fig. 1a

Fig. 1b

Fig. 2a

Fig. 2

CADOMITES DAUBENYI ; S. BUCKMAN, 1910, cit. spec.
Q.J.G.S. LXVI, 73, § 11, 3 ; Burton Bradstock, Dorset
S.B., ex Darell, Coll. 3305 ; S. 39, 44, 63, 22
S. 70, 43, 63, 25 ; 33 ribs ; max. c. 110

POLYSTEPHANUS DAUBENYI, Gemmellaro sp.
Parkinsonian, *truellei* ; Genotype

Fig. 1 Fig. 1a

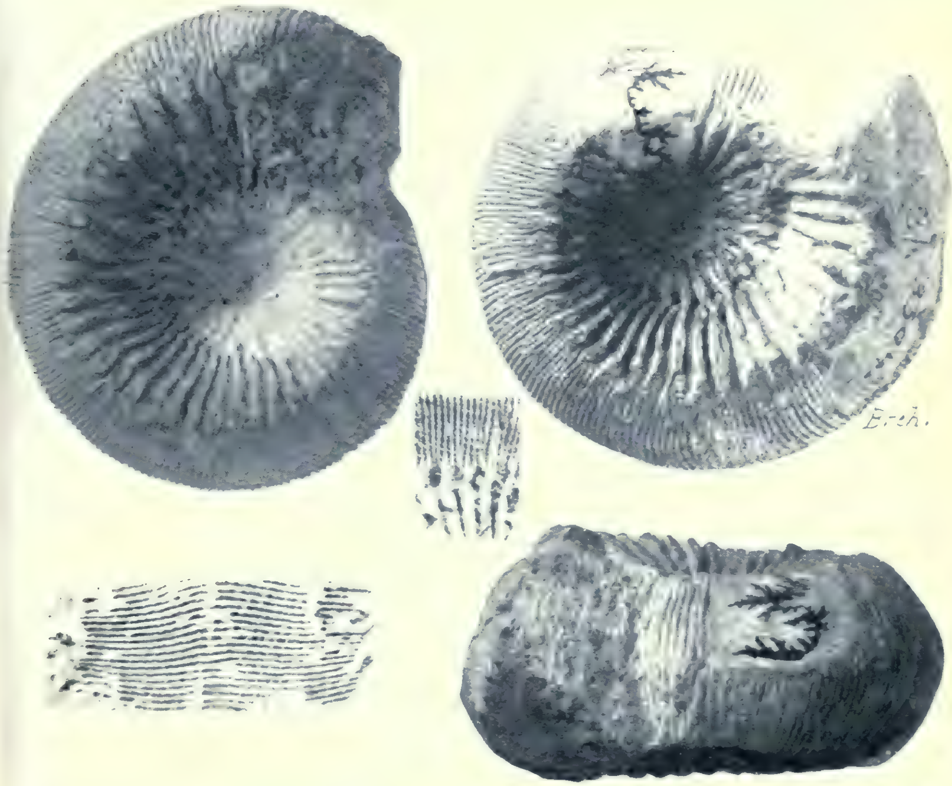


Fig. 2a Fig. 1b Fig. 2

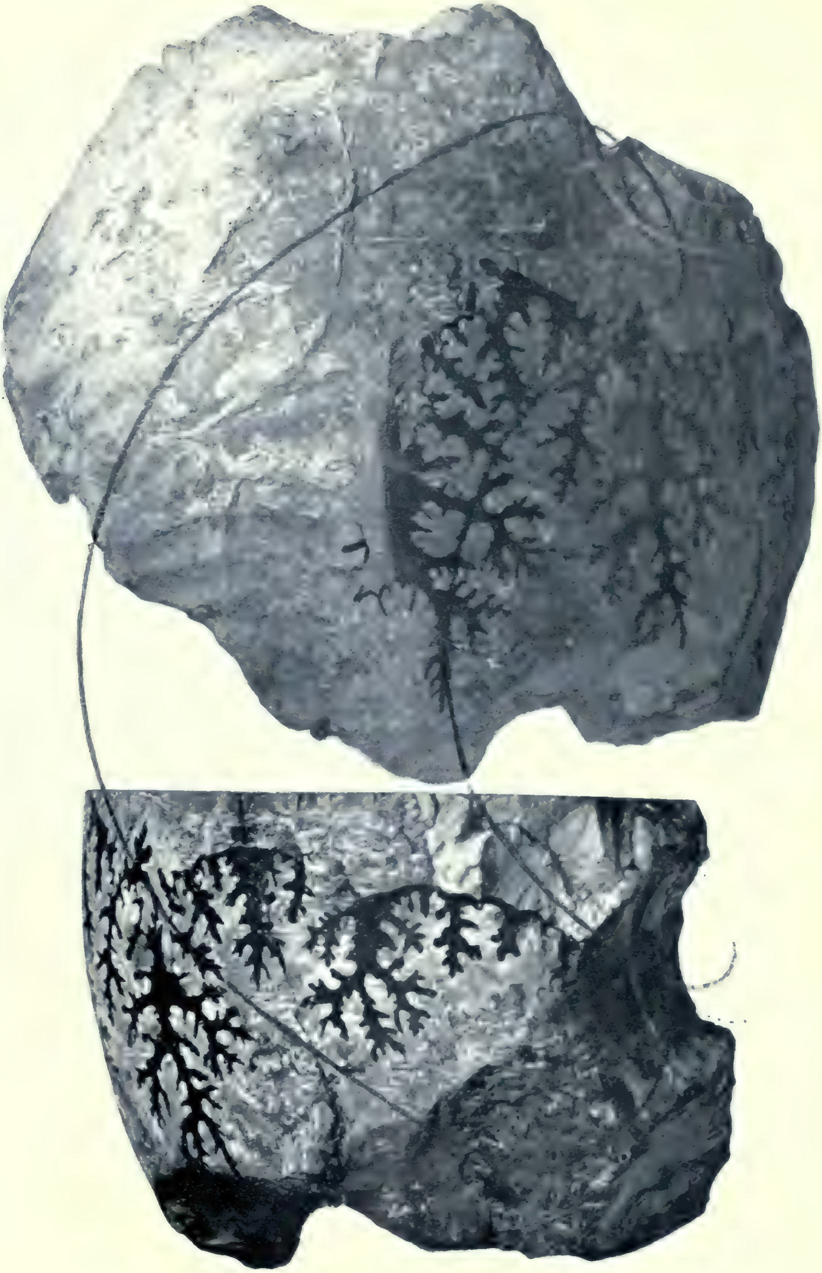
AMMONITES LINGUIFERUS
Bradford Abbas, Dorset ; [Q.J.G.S. XLIX, 1893, 485, § 11, 3]
S.B., ex J. B., Coll. 3304 ; S. 37, 40, 50, 28·5
S. 61, 39, 53, 33 ; 39 ribs ; max. c. 85

STEGEOSTEPHANUS STEGEUS, nov.
Parkinsonian, *truellei* ; Genotype, Holotype

Fig. 2
×0·95

Fig. 3
N.S.

Fig. 1
×0·95



MACROCEPHALITES MACROCEPHALUS
Backwater (N.E. end), Radipole, Weymouth, Dorset
Clay over Cornbrash, pinkish nodule ; S. B. Coll. 3598
S. (81, 50, 112, — ; 168, 47, 84, 6·5) est. ; max. c. 240

MACROCEPHALICERAS MACROCEPHALUM, SCHLOTTHEIM SP.
Macrocephalitan, *Pleurocephalites* ; Genotype. Cf. CCLXXXIV

COELOCERAS LONGALVUM, VACEK
Louse Hill, Nether Compton, Dorset ; I.O. ?*discites*
S.B. Coll. 1527 ; S. 108. 23. 31. 44 ; 130. 24. 27. 57
Ribs 38 ; max. 140 ; mouth with strongly-raised band

DOCIDOCERAS PERFECTUM, NOV.
Sonninian, *Eudmetoceras* ; Holotype. See CCLXIV

Fig. 1

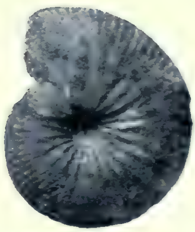
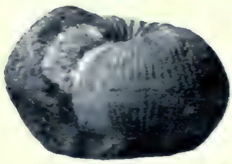


Fig. 2



ERYCITES FALLAX

Marston Road Quarry, Sherborne, Dorset ; I.O., *murchisonæ*

Calcareous-arenaceous matrix ; S.B. Coll. 235

S. 16·5, 52, 68, — ; 30, 52, 65, 9·5 ; last wh. all body-chamber

ERYCITES SPHÆROCONICUS, nov.

Ludwigian, *Erycites* ; Holotype. See CCXLVI

Fig. 1

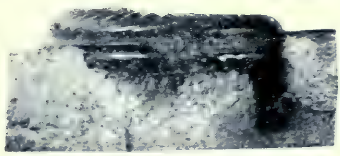


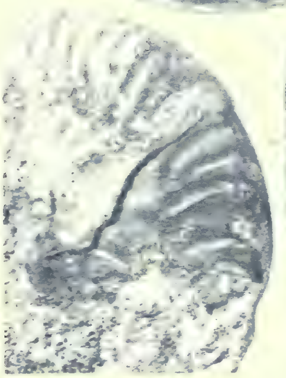
Fig. 2

AMMONITES MURLEYI, J. BUCKMAN in Moxon, 1841, Paratype
(Foss. Brit. Str.); "Dumbleton, Glos; Upper Lias 3, Fissile Marl"
(Geol. Chelt. 1844, pp. 36, 90); o, Fry of Lamellibranch
S.B., ex J.B., Coll. 2188; S. 35, 37, 26, 39; max. c. 37

MURLEYICERAS APTUM, nov.
Harpoceratan, *murleyi*; Holotype. See CCXLV

Fig. 1

Fig 2



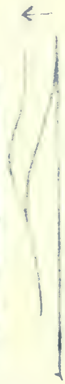


Fig. 4

Fig. 3

OPPELIA cf. PLICATELLA, GEMMELLARO
Bradford Abbas, Dorset ; I.O., Fossil Bed, *discites*
S.B. Coll. 3050 : S. 80, 50, 28, 3·5 : max. c. 200 +
Fig. 2, Test of inside, overlapping whorl, distinct from overlapped

KLEISTOXYITES PROTRUSUS, nov.
Sonninian, *Eudmetoceras* ; Genotype, Holotype. Cf. CCCIII

Fig. 1

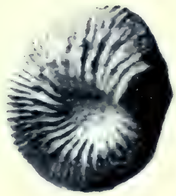


Fig. 2

AMMONITES TORICELLII, OPPEL, 1862, Syntype
Pal. Mitth. III, 153; "Ehningen, Würt.; Kell. Gr., z. *Am. macroc.*"
Bluish, hard marl; Pal. Mus., Munich (Oppel Coll.)
S. 16·5, 39, 53, —; 22·5, 47, 49, 22; size c. 27; 26 ribs; max. ?

TORICELLICERAS RUNCINATUM, NOV.
Macrocephalitan, *Kepplerites*; Holotype. See CCCX

Fig. 1

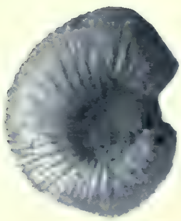


Fig. 2

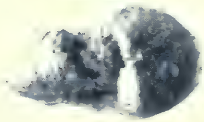


Fig. 3

Ammonites toricellii, Oppel, 1862, Syntype
Pal. Mitth., III. 153 ; " Ehningen, Württ. : Kell. Gr., z. *Am. macroc.*"
Greyish-brown, hard marl ; Pal. Mus., Munich (Oppel Coll.)
S. 17·5. 37. 45. 42 ; 27. 41. 52. 35 ; 30 ribs ; max. c. 33

TORICELLICERAS SUBROTUNDUM, nov.
Macrocephalitan, *Kepplerites* ; Holotype. See CCCXVIII

Fig. 2a

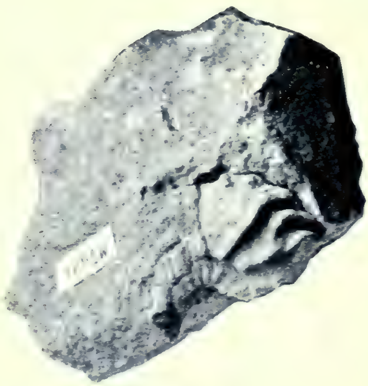
Fig. 1a

Fig. 2

Fig. 1

"AMMONITES SUTHERLANDIÆ"
"Clyneleish Quarry, Clyneleish, Brora, Sutherland, Scotland
"Sandstone," white, siliceous ; Geol. Surv. Scotl. *M*1498 *g*
S. (65, 43, 29, 21·5 ; 102, 50, 33·5, 19 ; 120, . 37·5, 26 ; max. c. 125

SUTHERLANDICERAS ALBISAXEUM, NOV.
Vertumniceratan, *sutherlandiæ* ; Genotype, Holotype. Cf. CLVI



AMMONITES SUTHERLANDIÆ
" Clyneleish Quarry, Clyneleish, Brora, Sutherland, Scotland
" Corallian ;" white, siliceous ; Geol. Survey, Scotland Coll. *M* 769 *g*
S. 32·5, 37, 27, 32

SUTHERLANDICERAS ALBISAXEUM, NOV.
Vertumniceratan, *sutherlandiæ* ; Paratype

Fig. 1 Fig. 2

Ammonites vaschaldi, Reynès (Collot, 1880), Holotype
Descr. géol. d'Aix, p. 27; "Esparron, Bouches du Rhone." France
Marseilles Museum, Plaster-cast from Prof. J. Repelin
S. 46, 32·5, 24, 30; see T.A. III, pp. 23, 24

EBRAYICERAS VASCHALDI, Reynès-Collot sp
Zigzagiceratan, *zigzag*; Plastotype. See CLXXIV

Fig. 1a

Fig. 1

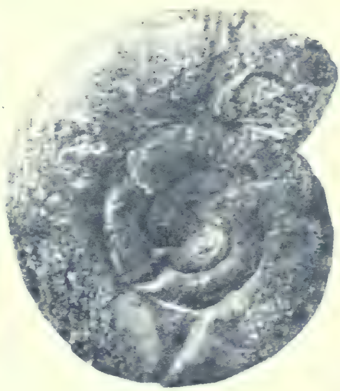


Fig. 1b

× 2

"Ammonites pygmæus"
"Burton Bradstock, Dorset; I.O." [1st bed]
S.B., ex Darell, Coll, 3324; S. 28·5, 29, 20, 47·5
Isochronous homœomorph of *Lyt. tripartitum*; Roman, 1921, vii, 1

POLYSPHINCTITES POLYSPHINCTUS, nov.
Zigzagiceratan, *zigzag*; Genotype, Holotype. Cf. CCCXXI

× 2

Serpenticone Morphoceratid
Grange Quarry, Broad Windsor, Dorset ; *Parkinsoni* z.
S.B. Coll., 3320. S. 32, 27, 21, 50
Suture-line with well-developed lobes

POLYSPHINCTITES POLYSPHINCTUS, NOV.
Zigzagiceratan, *zigzag* ; Paratype

Fig. 1

Fig. 1a

× 1·9

SERPENTICONE MORPHOCERATID
Grange Quarry, Broad Windsor, Dorset ; I.O., [top bed]
S.B. Coll. 3310 : S. 28·5. 30. 25. 46
Lobes short (degenerating ?) ; body-chamber swelling

POLYSPHINCTITES POLYSPHINCTUS, S. BUCKMAN
Zigzagiceratan, *zigzag* ; Paratype

Fig. 2a Fig. 1 Fig. 2

Fig. 3 × 2

Ammonites pygmæus, d'Orbigny
(1846, Terr. Jur. Céph. cxxix, 12, 13); Louse Hill, Compton, Dorset
Irony Bed, *Humphriesianum* zone; S.B. Coll. 3779
S. 10. 25. 23. 52 : 20. 20. 23 ? 53 : max. c. 28 mm.

NANNOLYTOCERAS PYGMÆUM, d'Orbigny sp.
Stepheoceratan, *blagdeni*

× 2

Fig. 2 Fig. 1

PERISPHINCTES PYGMÆUM ; S. BUCKMAN, 1881, cit. spec.
Q.J.G.S. XXXVII, 602 ; *Nannolytoceras*, S.B. 1903, Id., LXI, 151
Louse Hill ; Irony Bd., *Ter. lowensis* attached ; S.B. Coll. 3777
S. 16·5, 26, 27, 50 ; 26, 27, 28, 52 ; max. c. 28 ; b.-ch $\frac{3}{4}$ wh. +

NANNOLYTOCERAS SUBOVALE, NOV.
Stepheoceratan, *blagdeni* ; Holotype

Fig. 1

Fig. 2

× 2

NANNOLYTOCERAS PYGMÆUM : S. BUCKMAN
[1905. Q.J.G.S. LXI. 151] ; "Louse Hill" [Compton, Dorset] ; I.O.
"Irony Bed". Q.J.G.S. 1893. XLIX. 488. § vi. 4]. *Humphr. z.*
S.B., ex Darell, Coll. 3778 ; S. 16·5, 26, 24 +, 50

NANNOLYTOCERAS SUBOVALE, NOV.
Stepheoceratan, *blagdeni* ; Paratype

× 0·25

AMMONITES PSEUDOGIGAS
Barrel Hill, Long Crendon, Buckinghamshire
S.B. Coll. 3391 : S. 270. 34. 41·5. 42
S. 480. 33. 34. 42 : 39 ribs ; plain mouth

TROPHONITES TROPHON, NOV.
Gigantitan, *Trophonites* ; Genotype, Holotype

Fig. 2 N.S. Fig. 1 × 0·34

AMMONITES PSEUDOGIGAS
Long Crendon ; Portland Beds, "Creamy Limestones" [" Soft Rock," next below " Blue Bed "] ; S.B. Coll. 3361
S.l. subsimple, ll. shortish, L1, strong lobule inside

TROPHONITES TROPHON, NOV.
Gigantitan, *Trophonites* ; Genotype, Holotype

Fig. 1 Fig. 3

Fig. 2a

Fig. 2b

PERISPHINCTES MARTINSII
" Vetney Cross, Bridport, Dorset ; I.O., *garantiana*, Shell Bed "
Geol. Surv. Engl. (S.B. Coll.), 26752 ; *a*, coronate stage
S. 39, 25, 28, 55 ; 52 ribs ; S. 78, 29·5, 31, 52 ; max. c. 120

PRORSISPHINCTES OMPHALICUS, NOV.
Parkinsonian, *garantiana* ; Holotype. See CC

Fig. 1

Fig. 2

Fig. 2b

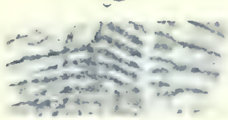


Fig. 2a

PERISPHINCTES EVOLUTOIDES
" Burton Bradstock, Dorset ; Inf. Ool., [1st Bed] "
S.B., ex Darell, Coll. 885 ; S. 37, 26·5, 31·5, 49
S. 61, 33, 29, 47·5 ; 47 ribs ; max. 62

PLANISPHINCTES PLANILOBUS, nov.
Zigzagiceratan, *zigzag* ; Genotype, Holotype. Cf. CCCXXVI

Fig. 3a

Fig. 1

Fig. 3

Fig. 2

Fig. 1a
× 1·7

PERISPHINCTES SUBBAKERIÆ ; Blake, 1905, Plesiotype
Mon. Cornbr. 48 ; v., 2 ; " Stalbridge Weston, Dorset ; Cornbrash
" Up. part of massive limest. above rubble beds " ; G. S. E. 8654
S. 63, 35, 28·5, 39·5 ; 43 ribs ; 103, 26·5, 23·5, 48 ; 35 ribs ; max. 106

HOMŒOPLANULITES HOMŒOMORPHUS, nov.
Macrocephalitan, *Homœoplanulites* ; Genotype, Holotype. Cf. CCXXVII

Fig. 1a
×1·7

Fig. 2

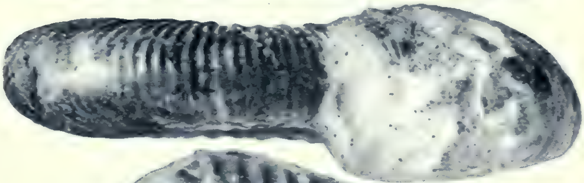


Fig. 1

PERISPHINCTES SUBBAKERIÆ
South Cave, S. Yorkshire ; Kellaways Rock, siliceous, ironshot
Mr. Frank Petch Coll. ; S. 44·5, 36, 28, 36 ; 40 ribs
S. 63, 35·5, 27, 36·5 ; 38 ribs ; 82, 35, 26·5, 38 ; 33 ribs ; max. c. 95

ANAPLANULITES DIFFICILIS, nov.
Macrocephalitan, *Catacephalites* ; Genotype, Holotype. Cf. CCCXXVIII

Fig. 2

Fig. 2a

Fig. 1a

Fig. 1

Fig. 3a

Fig. 3

PERISPHINCTES COMPTONI
" Rampisham, Dorset ; Oxford Clay " [Kell. Clay (a)]
Geol. Surv. Engl., ex Darell Coll., 7682 ; L1 at 13, 45
S. 39, 33·5, 30, 41 ; 62, 34, 27, 43 ; ribs 31 ; max. 65

PROPLANULITES LOBATUS, nov.
Proplanulitan, *majesticus* ; Holotype. See CCXXVII

× 1·7

"AMMONITES KOENIGI"
"Gristhorpe, Scarborough, Yorkshire; Kelloway Rock"
Geological Survey of England (Hudleston Coll.) 30777
S. 26, 34·5, 29, 42; ribs 27; size 30 mm.

PROPLANULITES ARCIRUGA, TEISSEYRE (T.A. III, p. 38)
Proplanulitan, *fracidus*. See CCCXXX

Fig. 1

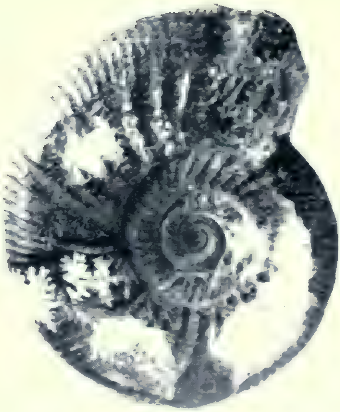


Fig. 2

" AMMONITES (PERISPHINCTES) PSEUDOMUTABILIS "
" Fleet Bridge, Weymouth, Dorset ; Oxford Clay "
Geol. Surv. Engl. 6509 ; S. 55, 35, 31, 37 ; max. c. 105
Central whorls smooth ; outer, ribs triplicate, broken on venter

TRINISPHINCTES TRINUS, NOV.
Kosmoceratan, *athleta* ; Genotype, Holotype. Cf. CCLXI

Ammonites vernoni, Bean MS. (Young & Bird, 1828, Holotype)
Geol. Yorksh., pp. 264, 265. 359; xii. 5; [Scarborough], "Yorkshire "Second Shale [Oxford Clay]," blue clay
Mus. Yorkshire Philosoph. Soc.; S. 42, 29, 22?, 39

KLEMATOSPHINCTES VERNONI, Bean-Young sp.
Cardioceratan, *vernoni*; Genotype. Cf. CCLI

Fig. 1

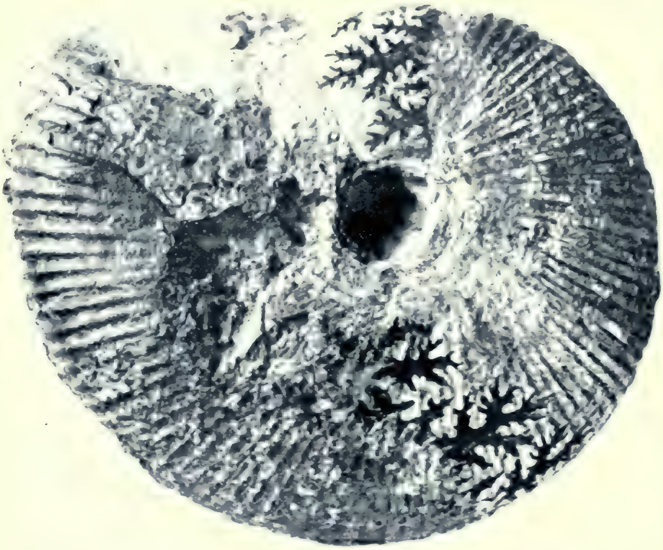
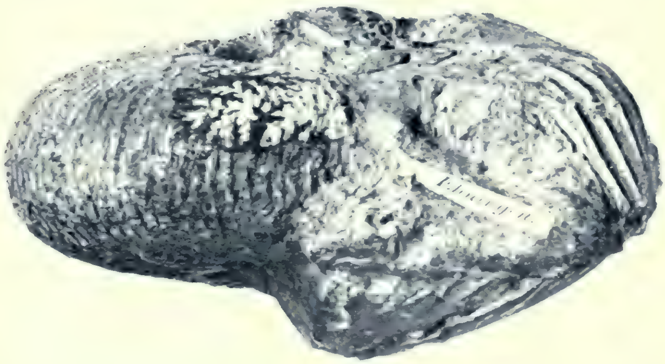


Fig. 2



MACROCEPHALITES MACROCEPHALUS; ZITTEL, 1884, Genotype
Handb. Pal. I, p. 470, Fig. 655; "Ehningen (Württemberg)
"Callovien"; Palæont. Mus., Munich (Oppel Coll.)
S. 50, 52, 57, 16; 90, 54, 55, 14; size 94; max. c. 250

MACROCEPHALITES VERUS, NOV.
Macrocephalitan, *Macrocephalites*; Holotype. Cf. CCLXXXIV

Fig. 1

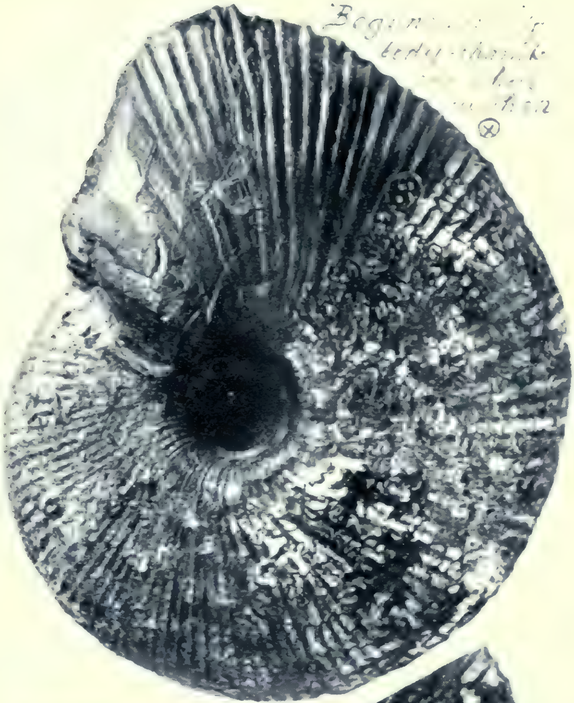


Fig. 1a

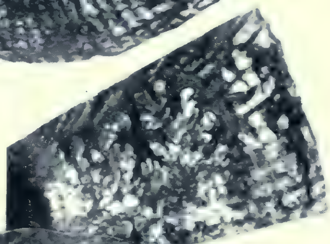


Fig. 1b

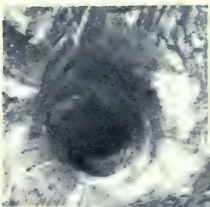


Fig. 2

AMMONITES MACROCEPHALUS, OPPEL, 1857, Cit. spec.
Juraf. 547; (*Macrocephalites macrocephalus*; Zittel, Genotype)
"Ehningen; Basis der Kellowaygruppe," Limonitic stone
Primary ribs c. 45, sec., c. 115; dorsal ll. shown c. 3/4 whorl

MACROCEPHALITES VERUS, NOV.
Macrocephalitan, *Macrocephalites*; Holotype

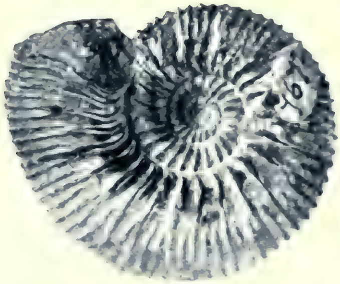
Fig. 1

Fig. 2

‘Stephanoceras’ crassizigzag a, S. Buckman, 1890, Holotype
Q.J.G.S. XLVI, 449; “Crewkerne Station, Somerset; I.O. [top bed]”
S.B., ex Darell, Coll. 3177
S. 28, 32, 50, 46; 49, 34·5, 51, 45; 20 ribs

ZIGZAGICERAS CRASSIZIGZAG, S. Buckman sp.
Zigzagiceratan, *zigzag*. See CCC

Fig. 1



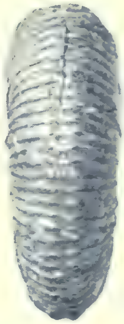
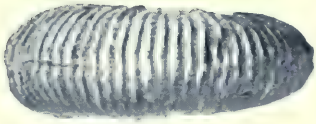


Fig. 3

Fig. 3a



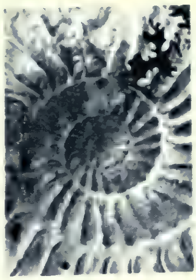
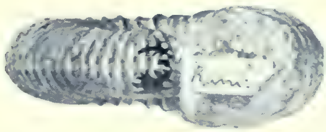


Fig. 1b
× 1·7

Fig. 2



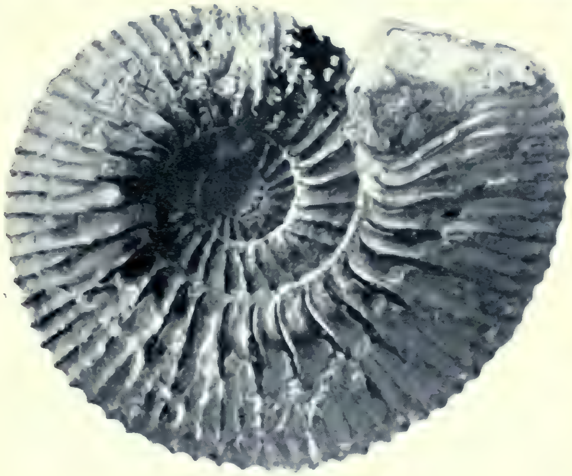


Fig. 1a × 1·7

AMMONITES GOWERIANUS
“ Rampisham, Dorset ; Oxford Clay,” [Kellaways Clay]
Geol. Survey England, ex Darell Coll., 7672
S. 24, 37, 35, 33 ; 44, 38·5, 34, 36·5 ; max. 44, with mouth
Lat. orn. 5*, 5* on 4, 4 ; Cadicone coronate to c. 6 mm.

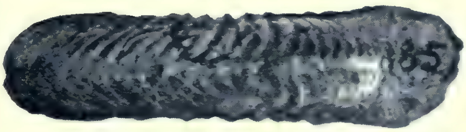
TORICELLITES APPROXIMATUS, nov.
Proplanulitan, *majesticus* ; Genotype, Holotype. Cf. CCCX

Ammonites interrupta, Bruguiere, 1789, Holotype
Ency. Méth., Vers I (1), 41 ; Protogr. Langi, Helv. 1708, xxv, 5 (copy)
Ribs were drawn reversed ; Mount St. Leger, [Switzerland], p. 98
F. (55, 31, 28, 48) estimated ; c. 40 ribs

PARKINSONIA INTERRUPTA, Bruguiere sp.
Parkinsonian, *garantiana*

Fig. 1

Fig. 2



PARKINSONIA RARECOSTATA ; S. BUCKMAN, 1910, cit. spec.
Q.J.G.S. LXVI, 67 ; " Burton Bradstock, Dorset ; *Astarte* Bed "
S.B. Coll. 3857 ; S. 37·5, 32, 30·5, 44 ; 55, 31, 25·5, 45 ; 40 ribs
S. 62·5, 30, 25·5, 45 ; 41 ribs ; max. 110 +, (another wh. by overlap mark)

PARKINSONIA INTERRUPTA, BRUGUIÈRE SP.
Parkinsonian, *garantiana*

Fig. 1

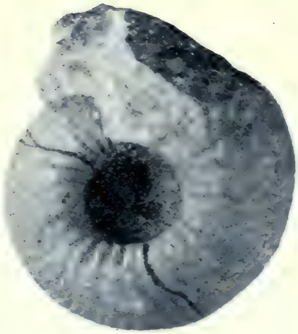
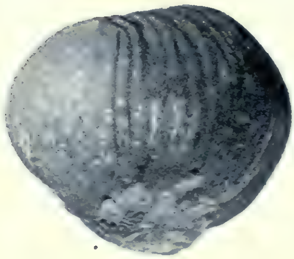


Fig. 2



AMMONITES SUBCONTRACTUS
" Sherborne, Dorset " ; [Fullers' Earth Rock, Thornford Beds]
Hard, grey cryst. limest. ; S.B. Coll. 2762, ex F. H. Butler
S. 29, 41, 67, 33 ; 38, 43, 71, 31·5 ; c. 28 ribs ; size c. 42

RUGIFERITES RUGIFER, S. BUCKMAN, III, pp. 46, 51
Tulitan, *Madarites* ; Paratype. Cf. CCLXX

Fig. 3

Fig. 1

Fig. 2

AMMONITES SUBCONTRACTUS
" Troll, near Thornford, Dorset ; Fullers' Earth Rock "
Thornford Beds, *Rhynchonella* Bed, No. 5 ; S.B., ex J.B., Coll. 1916
S. 54, 46, 70, 26 ; 91, 38·5, 40·5, 35 ; max. c. 100

RUGIFERITES RUGIFER, S. BUCKMAN, 1921, III, 46
Tulitan, *Rugiferites* ; Genotype, Holotype. See CCLXX

Fig. 1

Fig. 2

QUENSTEDICERAS FLEXICOSTATUM ; Sintzow
(1888, Carte géol. Russ. ; Mém. Comm. Géol. VII, 1, 1)
[Weymouth, Dorset ; Oxford Clay] ; J. W. Tutcher Coll.
S. 45, 36, 20, 34 ; max. c. 57. See CLIV & p. 17

BOURKELAMBERTICERAS INTERMISSUM, NOV.
Vertumniceratan, *lamberti* ; Holotype

AMMONITES DISPANSUS, LYCETT, 1862, Holotype
Proc. Cottesw. N.F.C. III, 5; "Frocester Hill, [Glos]; U. L. Sands"
Hologr. Lab. "The largest spec." p. 5; G.S.E. (Lycett Coll.), 24924
S. 77, 40, 19·5, 31; 139, 37, 19·5, 37; max. c. 146

PHLYSEOGRAMMOCERAS DISPANSUM, LYCETT SP.
Grammoceratan, *dispansum*

Fig. 2 Fig. 1

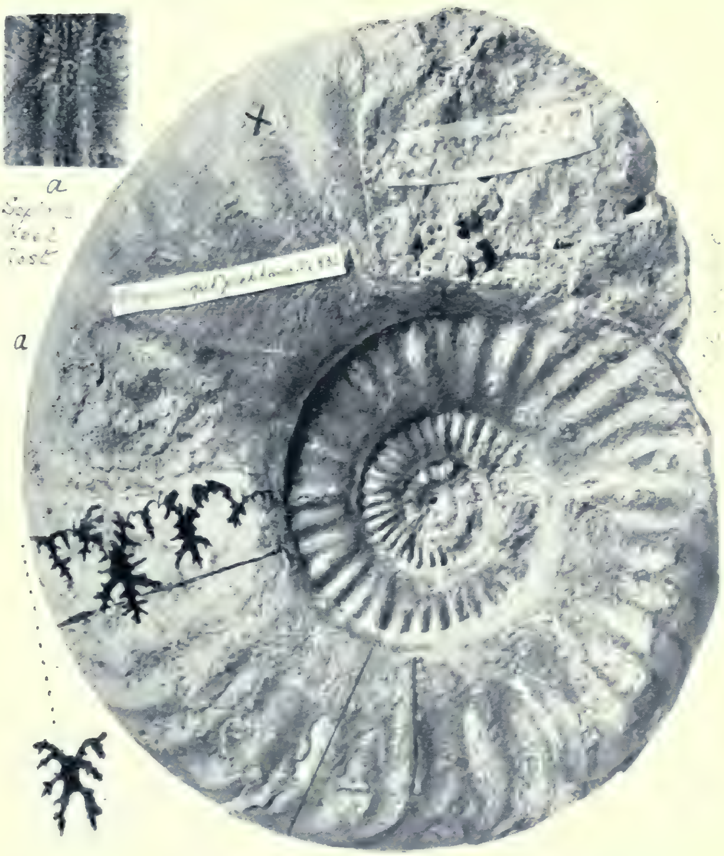


Fig. 2a

AMMONITES CORRUGATUS, J. BUCKMAN, 1844, cit. spec. ?
Geol. Chelt., New Ed., pp. 28, 80 ; " Leckhampton Hill, Glos
"Gryphite Grit" ; S.B., ex J.B., Coll. 835. Cf. *Am. jugifer*, Waagen
S. 108, 39, 20·5, 37, Keel 1·5 mm.= 3 mm. added ; max. c. 155

ZUGOPHORITES ZUGOPHORUS, NOV.
Sonninian, *Shirbuirnia* ; Genotype, Holotype. Cf. CLXVIII

× 0·45

AMMONITES BONONIENSIS
[Barley Hill], Thame, Oxon; Portland., "Blue Bed"
"Building Stone," glauconitic, with occasional Lydites
[Cf. W. H. Fitton, Geol. Trans. (2) IV, 1836, p. 282, Barley Hill, Bed 5]

BEHEMOTH LAPIDEUS, NOV.
Behemothan, *megasthenes*; Holotype. See CCCV

Fig. 2 Fig. 1

AMMONITES BONONIENSIS
S.B. Coll. 3228, purch. from a builder in Thame
Last part of outer whorl removed ; EL, 38 ; L1, 35 ; L2, 21 at 60
S. 206, 29, 33, 51 ; c. 38 ribs ; 325, 30, 27·5, 48·5 ; max. c. 430

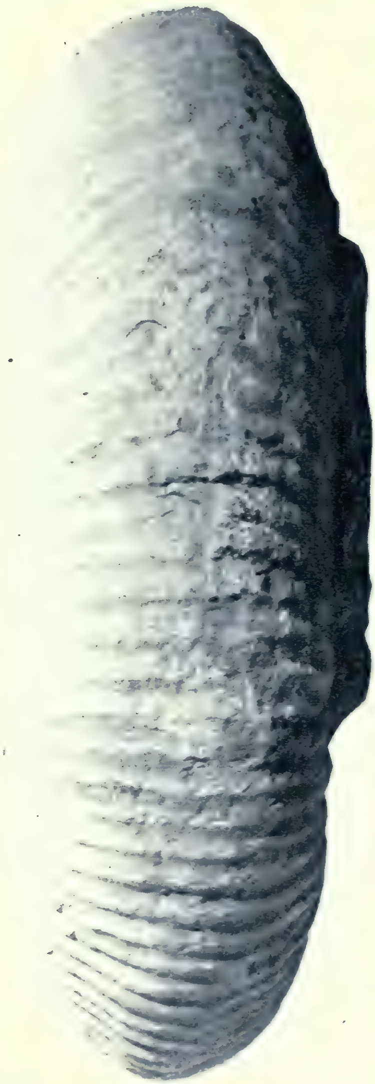
BEHEMOTH LAPIDEUS, nov.
Behemothan, *megasthenes* ; Holotype

× 0·2

AMMONITES GIGANTEUS
Barrel Hill, Long Crendon, Bucks ; Portl. ; S.B. Coll. 3224
S. 360, 32. 20. 45 ; 617. 31. 27. 46 ; 52 ribs ; max. c. 620
Body-chamber with part of mouth. L1, c. 50 ; L2, c. 36 per cent. at 114

TROPHONITES IMPERATOR, nov.
Gigantitan, *Trophonites* ; Holotype. See CCCXXV

× 0·28



AMMONITES GIGANTEUS
Barrel Hill, Long Crendon, Buckinghamshire
Portland Beds, Creamy Limestones, [Soft Rock]
S.B. Coll. 3224, purchased from workmen

TROPHONITES IMPERATOR, nov.
Gigantitan, *Trophonites*; Holotype. See CCCXXV

Fig. 1

Fig. 2

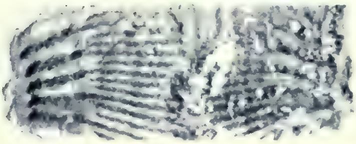


Fig. 2a

Fig. 1a

" STEPHANOCERAS SP. (' planulate ') "
" Coombe [Clatcombe], near Sherborne, Dorset " ; Cf. Clatcombe Farm
Q.J.G.S. XLIX, 1893, 499, § XIV, 5 ; S.B., ex T. C. Maggs, Coll. 605
S. 48, 34, 34, 42 ; 76, 27·5, 25·5, 48·5 ; 46 ribs ; max. 78

MOLLISTEPHANUS MOLLIS, NOV.
Sonninian, *mollis* ; Genotype, Holotype. Cf. CCXLIX

× 0·65

AMMONITES HUMPHRIESIANUS, CRASSICOSTA
" [Sandford Lane], near Sherborne, Dorset ;" S.B. Coll. 1239
S. 116, 32, 42, 46 ; 30 ribs ; 186, 28, 32, 50·5 ; 34 ribs ; max. 189
A coronate becoming planulate, loss of spines

KUMATOSTEPHANUS KUMATERUS, NOV.
Sonninian, *Labyrinthoceras*, Genotype, Holotype

Fig. 1

Fig. 2

AMMONITES HUMPHRIESIANUS CRASSICOSTA
"[Sandford Lane], near Sherborne, Dorset; Inf. Oolite [Fossil Bed, Up. part]," (Q.J.G.S. XLIX, 1893, 494)
S.B., ex Darell, Coll. 1239. Cf. CCCXIV

KUMATOSTEPHANUS KUMATERUS, nov.
Sonninian, *Labyrinthoceras*; Genotype, Holotype

Fig. 1

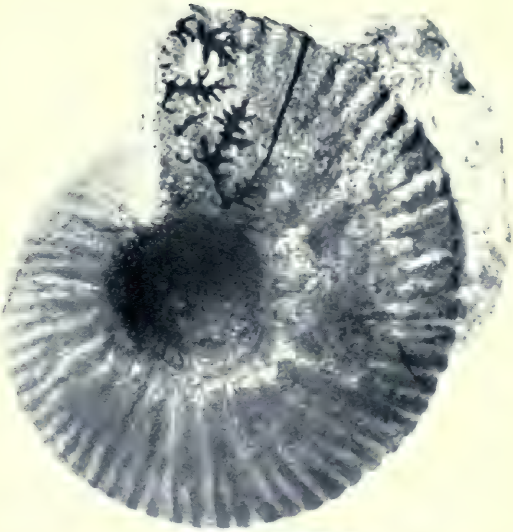


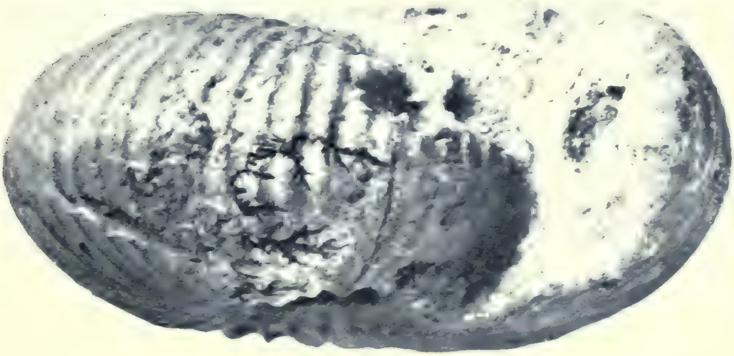
Fig. 2

AMMONITES ARBUSTIGERUS ; MORRIS & LYCETT. 1850, Plesiotype
Moll. G.O. 12 ; II, 4 ; " Minchinhampton, [Glos] ; G.O. Shelly Beds "
G.S. Engl. 25609 ; S. 40, 37·5, 45, 39 ; 69, 43, 45, 27·5
Ribs 23 ; max. c. 120 +. L1 short and approximate to EL

SUSPENSITES SUSPENSUS, NOV.
Oxyceritan, *suspensus* ; Genotype, Holotype. Cf. CCCI

Fig. 1

Fig. 2



MACROCEPHALITES HERVEYI ; Blake, 1905. Plesiotype
Mon. Cornbr. 46 ; III. 7. IV. 2 ; " Peterborough ; Cornbrash "
Yellow, marly ; Geol. Survey, Engl. 8050
S. 60. 45. 60. 22 ? ; 105. 45. 40·5. 23 ; c. 23 ribs ; max. c. 110

KAMPTOKEPHALITES KAMPTUS, nov.
Macrocephalitan. *kamptus* ; Genotype. Holotype. ' Cf. CCLXXXIV

Fig. 1

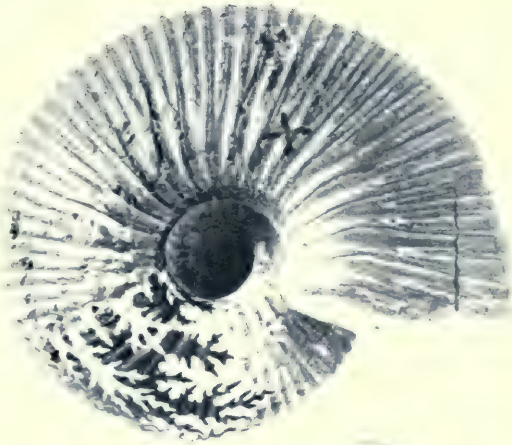


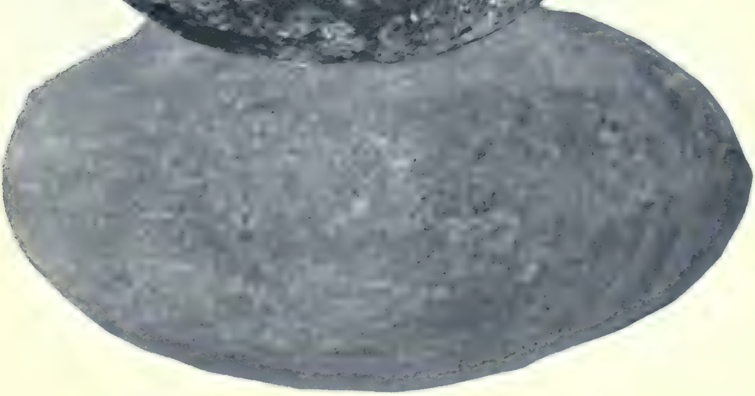
Fig. 2

MACROCEPHALITES PILA, NIKITIN
"Chippenham, Wilts; Oxford Clay," light blue clay
[Clay above Cornbrash]; Geol. Surv. Engl. 30567
S. 40, 44, 70, 20·5 ; 68, 45, 70, 21·5 ; 28 ribs ; max. c. 90

PLEUROCEPHALITES FOLLIFORMIS, nov.
Macrocephalitan, *Pleurocephalites*; Holotype. See CCLXXXIV

Fig. 1
× 0·55

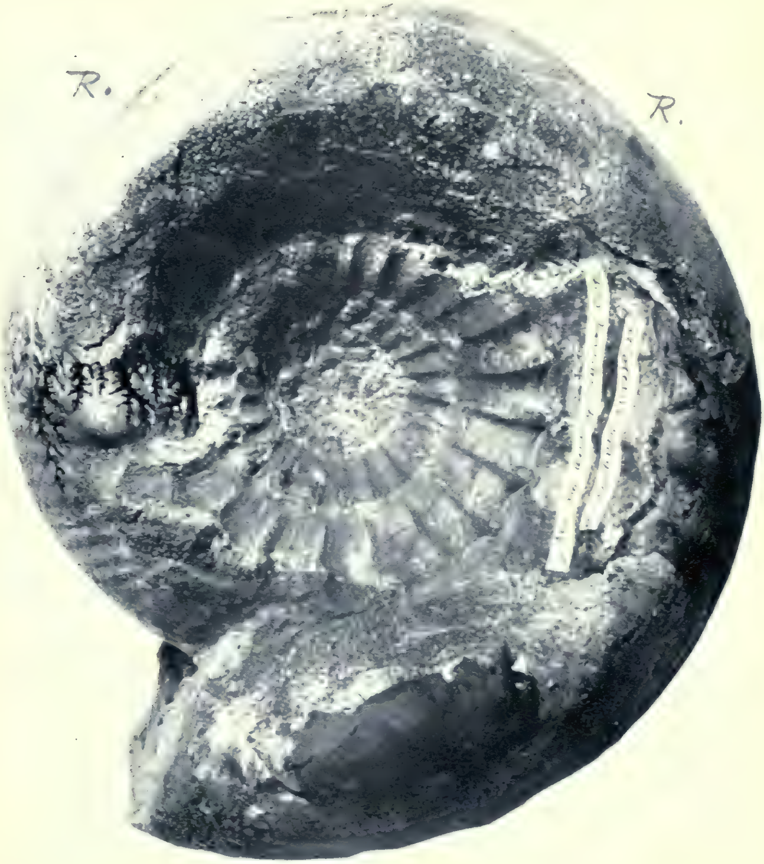
Fig. 2
× 0·44



AMMONITES CAPAX, YOUNG & BIRD, 1822, Holotype
Geol. Yorks. 253 ; " Malton, Yorks ; Oolite," =Hambleton Ool.]
Grey marly limest., many cream-col. ool. ; Whitby M. 1275
S. 163, 51, 65, 21 ; 231, 45, 54, 23 ; max. c. 250

GOLIATHICERAS CAPAX, YOUNG & BIRD SP.
Cardioceratan, *Goliathiceras*. See CLVI

× 0.75



Stephanoceras blagdeni: S. Buckman, 1881, cit. spec.
Frogden Quarry, Oborne, near Sherborne, Dorset; S.B. Coll. 1496
S. 98, 31·5, 69, 41·5; 132, 33·5, 71, 43; 21 ribs; size 146; max. c. 200 +
Thinner and less umbilicate than *Am. blagdeni*, J. Sow.

TELOCERAS LABRUM, nov.
Stepheoceratan, *Epalxites*; Holotype. Cf. CLXIV

STEPHANOCERAS BLAGDENI ; S. BUCKMAN, 1881, cit. spec.
Q.J.G.S. XXXVII, 595 ; Frogden Quarry, "Oborne, Dorset ; I.O.
" *Humphriesianum* z.," Roadstone, lower part, § I, 3, 589
Cf. Id. XLIX, 1893, 500, § xv, 7 ; *Cœloceras*, S.B., Id. LIV, 1898, 454

TELOCERAS LABRUM, NOV.
Stepheoceratan, *Epalxites* ; Holotype

Fig. 1

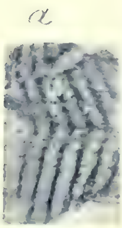


Fig. 2a

Fig. 2b

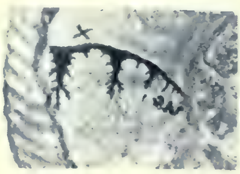


Fig. 1a

MORPHOCERAS POLYMORPHUM
[Grange Quarry], Broad Windsor, Dorset ; I.O., [top beds]
S.B., ex Darell, Coll. 3784
S. 53, 40, 42, 25·5 ; 82, 30·5, 25·5, 40 ; max. c. 93

PATEMORPHOCERAS PATESCENS, NOV.
Zigzagiceratan, *zigzag* ; Genotype, Holotype. Cf. CCCXXII

Fig. 1

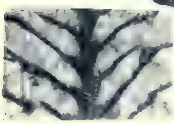


Fig. 2

Cosmoceras parkinsoni var. rarecostatum, S. Buckman
(Q.J.G.S. XXXVII, 1881, p. 599) ; " Burton Bradstock, Dorset
" Inf. Ool.," [Shell Bed], soft, ironshot ; S.B., ex Darell, Coll. 838
S. 63, 27, 22, 52 ; 37 ribs ; 101, 27, 20, 51 ; 46 ribs ; max. c. 133

PARKINSONIA RARECOSTATA, S. Buckman sp.
Parkinsonian, *garantiana*. See CCCXXXVII

× 0·75

AMMONITES TRIPLICATUS
Barrel Hill, Long Crendon, Bucks; Well-sinking; Lydite Bed
S.B. Coll. 3362; S. 100, 26·5, 34·5, 49; 149, 24·5, 33, 53
Max. 255; 45 ribs; EL, 57, L1, 49, L2, 26 at 26·5 mm.
EL, 69, L1, 55, L2, 35 per cent. at 32 mm. breadth of whorl

LYDISTRATITES LYDITICUS, NOV.
Paravirgatitan, *lyditicus*; Genotype, Holotype. Cf. CCCVII

Fig. 1 Fig. 2 Fig. 1a

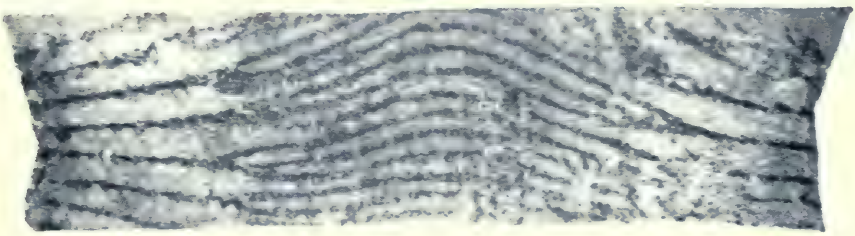
Fig. 2a Fig. 2b

AMMONITES TRIPLICATUS
[Swindon, Wiltshire, Portlandian ; Lydite Bed, white. Upper L.B.]
J. W. Tutcher Coll. ; S. 33·5, 41, 36, 27 ; 31 ribs
S. 53, 34, 30(34), 36 ; 26 ribs ; EL. 53, L1. 43, L2. 25 at 14 mm.

LYDISTRATITES LYDITICUS, NOV.
Paravirgatitan, *lyditicus* ; Paratype

Fig. 1
× 0·81

Fig. 2
N.S.



AMMONITES PECTINATUS, PHILLIPS, 1871, Topotype
(Geol. Oxf. 333 ; XV, 17) ; Headington, Oxford ; Shotover Grit Sands
S.B. Coll. 2941, purch. ; EL, 43 ? L1, 43, L2, 30, at 37 mm. whorl-breadth
S. 86, 40, 30 ? 32 ; 116, 33·5, 31, 38 ; c. 73 ribs ; 140, 31, 30·5, 43·5
C. 57 ribs ; max. with rostrum 149 +

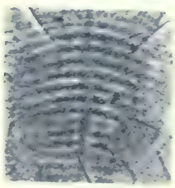
PECTINATITES PECTINATUS, PHILLIPS SP.
Paravirgatitan, *pectinatus* ; Genotype. Cf. CCCVIII

Fig. 1

Fig. 2

Fig. 2a

Fig. 2b



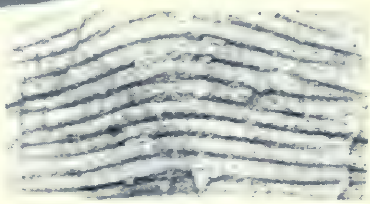
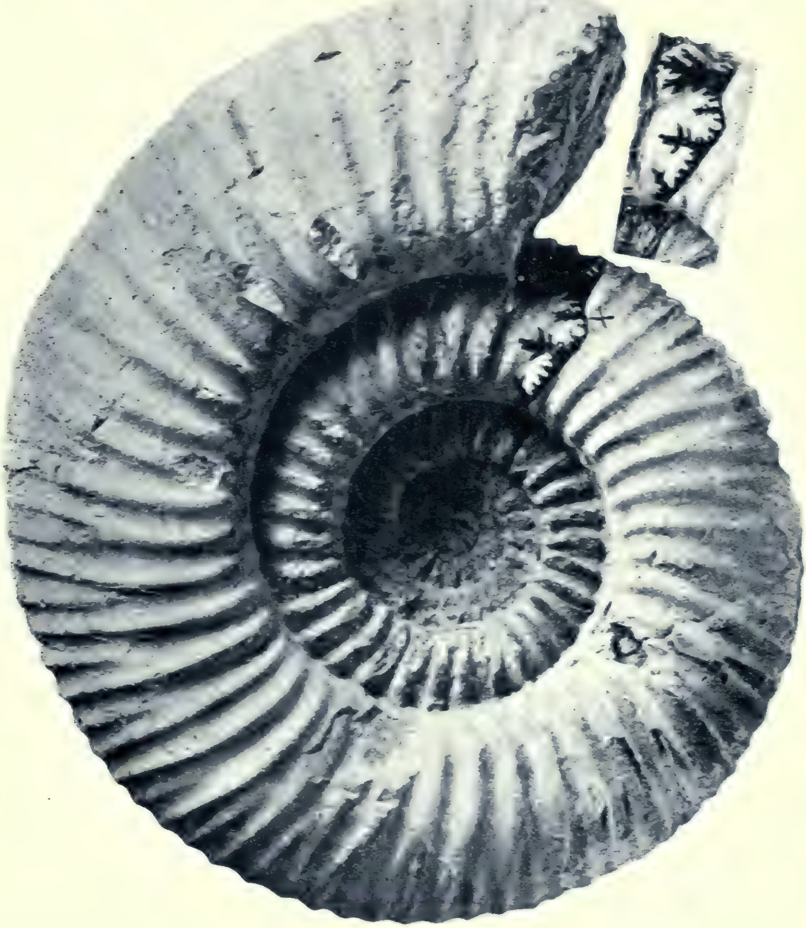


Fig. 2c

"Ammonites pectinatus"
"Swindon, Wilts; Portl. Sands," brown ironstone, siliceous, glauconitic
"Cemetery Beds"; G.S.E. 31670; EL. 39, L1, 41, L2, 27 at 27 mm.
S. 67, 40, 31·5, 26; 116, 35, 30, 37; 78 ribs; max. with rostr. 127

PECTINATITES PECTINATUS, Phillips sp.
Paravirgatitan, *pectinatus*

× 0·48



AMMONITES BONONIENSIS
Haddenham, Bucks, Works N. of Station; Portl. Stone
Blue and Cream Bed [= Long Crendon Blue Bed]
S. 152, 33, 40, 43; 31 ribs; 267, 33·5, 33, 45; 43 ribs

GALBANITES GALBANUS, NOV.
Gigantitan, *Gigantites*; Genotype, Holotype

Fig. 2a

Fig. 1

Fig. 2

AMMONITES BONONIENSIS
Haddenham, Bucks; Portlandian, Creamy Limestones
S.B. Coll. 3411, pres. Mr. Spencer Jackson
EL, 45, L1, 41, L2, 26 per cent. at 50 mm.

GALBANITES GALBANUS, S. BUCKMAN, 1922
Gigantitan, *Gigantites*. Cf. CCCXXV

Fig. 1 × 0·83

Fig. 2 N.S.

HAMMATOCERAS PLANINSIGNE ; S. BUCKMAN, 1889, cit. spec.
Q.J.G.S., XLV, 661 ; [Haselbury, Somerset] ; " *Murchisonæ* z.," S.B.
(Hudleston, Mon. Gastr., 1887, 41, § III, [3], " Keeled Ammonite ")
S.B., ex Wright, 471 ; S. 98, 37·5, 25, 31 ; 150, 34, 22, 37·5 ; max. 152

PLANAMMATOCERAS PLANIFORME, NOV.
Ludwigian, *Erycites* ; Genotype, Holotype. Cf. CCXCIX

Fig. 2

Fig. 1

SPHÆROCERAS GERVILLII

"Near Sherborne, Dorset; Inf. Ool." [*Humphriesianum* z.]

S.B., ex Darell, Coll. 1247; S. 44, 48, 89, 19

S. 74, 40, 63, 25; size to mouth edge, 75, over ridge, c. 83 mm.

CHONDROCERAS GRANDIFORME, nov.

Stepheoceratan, *Epalxites*; Holotype. Cf. CCLVIII

Fig. 1a

Fig. 2a

Fig. 2b

Fig. 1
×1·1

Fig. 2

AMMONITES GARANTIANUS

Burton Bradstock, Dorset ; Inf. Ool., "*Astarte* Bed (Shell Bed)."

Q.J.G.S., LXVI, 1910, 97 ; S.B., ex Darell Coll. 3050

S. 24·5, 37, 42, 30 : 45, 41, 40, 35 : 30 ribs ; max. c. 52

GARANTIANA GARANTIANA, D'ORBIGNY sp.

Parkinsonian, *Garantiana*. Cf. CCXL

Fig. 2a

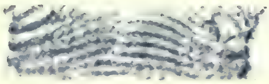


Fig. 1

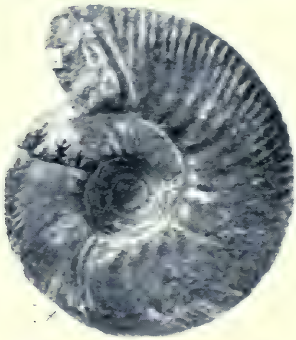
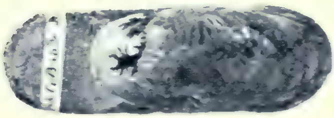


Fig. 2



AMMONITES POLYMORPHUS

"Burton Bradstock, Dorset ; Inf. Oolite," [Top of 1st bed Q.J.G.S., LXVI, 1910, 65 ; S.B., ex Darell, Coll. 3856

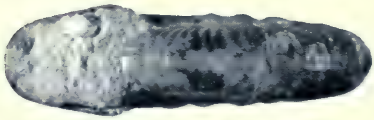
S. 26·5, 41, 45, 36 : 43, 32·5, 31, 37 ; max. c. 52

POLYSPHINCTITES REPLICTUS, nov.

Zigzagiceratan, *zigzag* ; Holotype. See CCCXXII

Fig. 1

Fig. 2



Ammonites koenigi
[Kellaways, Wiltshire, Kellaways Rock (d) ?]; J.W.T. Coll.
S. 26·5, 40, 32, 34 ; 48, 38, 20, 34 ; 10 ribs ; max. c. 60
L1 at 14 mm. of whorl-breadth is 23 per cent.

PROPLANULITES TRIFURCATUS, S. Buckman, III, 39, 40
Proplanulitan, *opimus* ; Holotype See CCCXXI

Fig. 1

Fig. 1a

Fig. 2

Fig. 1b

CARDIOCERAS GOLIATHUS
"Loch Staffin, Isle of Skye, Scotland; Oxford Clay"
[Equiv. to Lower Calc. Grit of Yorkshire]; Geol. Surv. Engl. 30380
S. 23, 43·5, 41·5, 22; 42·5, 47, 52, 24; max. c. 56 +

KORYTHOCERAS KORYS, S. BUCKMAN, III, 17
Cardioceratan, *Korythoceras*; Genotype, Holotype. Cf. CCXCVI

Fig. 2 Fig. 1

Harpoceratoid Ammonite, S. BUCKMAN, 1910, Cit. Spec.
Q.J.G.S., LXVI, 65, § 1, 10 *i*; Thorncombe Beacon, Bridport, Dorset
Mid. Lias Marlst. of Junct. Bed (*serrata* bed); S. B. Coll. 3816
S. 73. 41. 22·5. 27·5 : 122. 35·5. 21. 37 ; size 125 ; max. 130

PALTARPITES PALTUS, NOV.
Harpoceratan, *paltus*; Genotype, Holotype. Cf. CCCXVI

Harpoceratoid Ammonite
" Down Cliff, [Thorncombe Beacon, Bridport, Dorset] ; Lias "
[Marlst. of Junct. Bed (*serrata* bed)] ; S.B. Coll. 3818, pres. E. Wilson
S. 46, 40, 25, 27 ; 82, 40, 23, 29 ; (150, —, —, 39) ; max. c. 150

PALTARPITES PALTUS, S. BUCKMAN, 1922
Harpoceratan, *paltus* ; Paratype. Cf. CCCXVI

Fig. 2 Fig. 1 Fig. 3

AMMONITES KURRIANUS
"South Petherton" [Somerset; Middle Lias, Rock Bed, below *spinatum*]
S. B., ex Darell, Coll. 1112; S. 71, 42, 17·5, 28
S. 140, 39·5, 16, 34, (4 mm. for keel); max. c. 200

ARGUTARPITES ARGUTUS, NOV.
Amaltheian, *argutus*; Genotype; Holotype. Cf. CCCLXII

Fig. 2 N.S. Fig. 1 × 0·95

AMMONITES PERARMATUS
" Clyneleish, Brora, Sutherland, Scotl. ; Sandstone "
White Bed, siliceous ; Geol. Surv. Scotland, *M.* 766g
S. 70. 34. 24 +. 40 : 133. 31. 22·5. 43·5 : max. 100 +

ASPIDOCERAS SILPHOUENSE, YOUNG & BIRD SP. 1822
Vertumniceratan, *silphouense*

Fig. 2 Fig. 1

Ammonites silphouensis, Young & Bird, 1822, Holotype
Geol. Yorks, 250, 327 ; xii, 5 ; Silphoue Moor, Yorkshire
Calcareous sandstone below the [Corallian] oolite ;
Whitby Museum, no *No.* ; S. (242, 26, 18, 46) ? max. c. 300

ASPIDOCERAS SILPHOUENSE, Young & Bird sp.
Vertumniceratan, *silphouense*

× 0·51

PERISPHINCTES EASTLECOTTENSIS
Wheatley, Oxon. Brickyard ; Wheatley Sands (p. 28)
S.B. Coll. 3800 ; L1, 60, L2, 39·5 at 71 mm. whorl-breadth
S. 180, 35, 25 +, 38 ; 235, c. 33·5, 24 +, 41 ; max. c. 415

WHEATLEYITES TRICOSTULATUS, NOV.
Paravirgatitan, *Wheatleyites* ; Genotype, Holotype. Cf. CCCLIV

Fig. 3 N.S. Fig. 1 × 0·73 Fig. 2 N.S.

a

a

PERISPHINCTES MARTINSI
Vetney Cross, Bridport, Dorset; I.O., Shell Bed [upper part]
S.B. Coll. 3477, purch.; ⟶ [large scar of repaired injury]
S. 59, 33, 32, 45; 97, 34, 33, 46; 148, 30, 24, 48; max. c. 260.

VERMISPHINCTES REPARATOR, nov.
Parkinsonian, *Vermisphinctes*; Holotype. See CXC

Fig. 1a

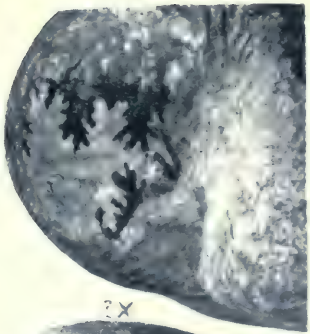


Fig. 1

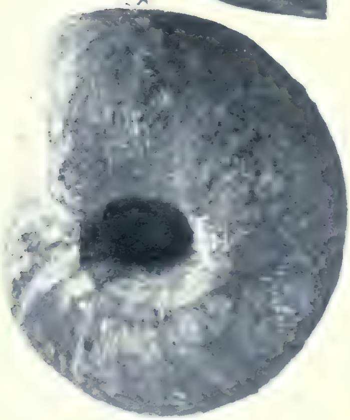
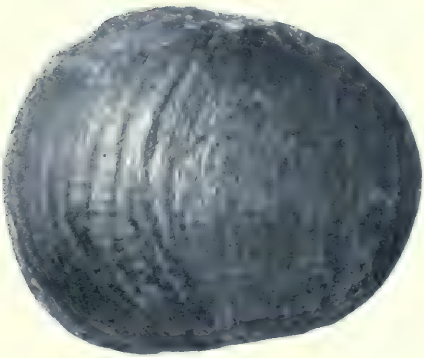


Fig. 2



" Ammonites subcontractus "
" Troll, near Thornford, Dorset "; F. E. Rock, (Thornford Beds)
[Troll §, below 9 ?] ; S.B. ex Darell, Coll. 1918 ; S. 31·5, 41, 92, (30 ?)
S. 44, 45, 86, 27 ; 55, 51, 84, 20 ; max. c. 75

SPHÆROMORPHITES SPHÆROIDALIS, S. Buckman, 1921, III, 49
Tulitan, *Sphæromorphites* ; Genotype, Holotype. See CCCXXXVIII

× 0·96

"AMMONITES SUBCONTRACTUS"
"Troll, near Thornford, Dorset"; Fullers' Earth Rock, (Thornf. Beds)
[Troll §, Bed 1]; S.B., ex J.B., Coll. 1914; S. 82, 30, 87, 33
S. 110, —, 71, - -; 137, 32, 50, 38; max. 140

TULOPHORITES PRÆCLARUS, S. BUCKMAN, 1921, III, 45
Tulitan, *Tulophorites*; Holotype. Cf. CCLXXI

"Ammonites subcontractus"
"Troll, near Thornford, Dorset"; Fullers' Earth Rock
Thornford Beds, [Troll §, Bed 1]; S.B., ex J.B., Coll. 1920
S. 66, 42, 88, 27; 82, —, 79, —; 110, 36, 51, 35; max. c. 118

TULOPHORITES TULOTUS, S. Buckman, 1921, III, 45
Tulitan, *Tulophorites*; Genotype, Holotype. See CCCLXVII

Fig. 3

Fig. 1a

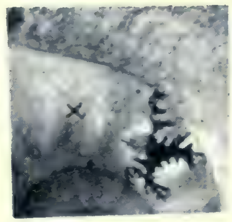


Fig. 1

Fig. 2

" Ammonites subcontractus "
S.B. Coll. 1920 ; Fig. 1, Side view showing contraction, in cast, preceding end-band of conch ; Fig. 3, Ventral view showing same contraction and band, also few ribs of low relief

TULOPHORITES TULOTUS, S. Buckman, 1921, III, 45
Tulitan, *Tulophorites* ; Genotype, Holotype

MACROCEPHALITES SP.
"Troll, near Thornford, Dorset"; F. E. Rock (Thornford Beds)
[Troll §, Bed 7, or 7–9]; S.B., ex J.B., Coll. 1919; S. 56, 45, 82, (23?)
S. 74, 42, 82, 22; size c. 95; ribs c. 35; max. c. 105

PLEUROPHORITES PLEUROPHORUS, S. BUCKMAN, 1921, III, 47
Tulitan, *Pleurophorites*; Genotype, Holotype. Cf. CCLXXII

Fig. 1

Fig. 2

MACROCEPHALITES SP.
"Troll, near Thornford, Dorset"; Fullers' Earth Rock
Thornford Beds, [Troll §, 7, or 7–9] ; S.B., ex J.B., Coll. 1927
S. 60, 41, 69, 25 ; 92, 40, 55, 27 ; ribs c. 32 ; max. c. 105

PLEUROPHORITES POLYPLEURUS, S. BUCKMAN, 1921, III, 47
Tulitan, *Pleurophorites* ; Holotype. See CCCLXX

Fig. 1

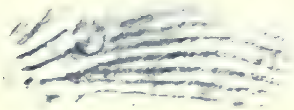


Fig. 2

MACROCEPHALITES TYPICUS, BLAKE, 1905. Paratype
Mon. Cornbr., pp. 40, 42, No. 27; Fig. 4 [b] (no name); "Peterborough Cornbrash," blue-grey marly stone; Geol. Surv. Engl. 8651
S. 45, 49, 51, 15?; 86, 47·5, 44, 16; ribs c. 28 (1), 89 (2); max. c. 90

DOLIKEPHALITES DOLIUS, nov.
Macrocephalitan, *dolius*; Genotype, Holotype; Cf. CCCXLVII

Fig. 1 Fig. 1a

Fig. 2
Fig. 2a
Fig. 1b

MACROCEPHALITES MACROCEPHALUS
" Peterborough ; Cornbrash " ; [Oeschingen, Wurtemberg ; Callovian]
Test limonite ; matrix, blue and brown, ironshot ; J.W.T. Coll.
S. 44. 48. 50. 16 ? ; 62. 52. 45. 15 ; size 68 ; max. c. 120

TMETOKEPHALITES BATHYTMETUS, nov.
Macrocephalitan, *Macrocephalites* ; Genotype, Holotype. Cf. CCCLXXII

Fig. 1

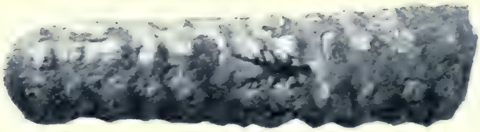
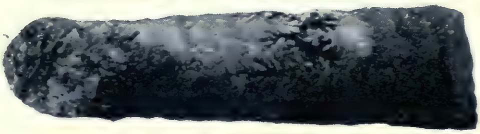


Fig. 2

Fig. 3



Ancyloceras bifurcatum, S. Buckman, 1881, cit. spec.
Q.J.G.S., XXXVII, 607; Frogden, "Oborne, Dorset; *humphr.*"
Roadst., up. pt., [Q.J.G.S., 1893, XLIX, 500, § xv, 3]; S.B. Coll. 3793
Breadth: Thickn., 100 : 97. F. 1, Lat., F. 2, ventr., F. 3, dorsal view

RHABDODITES RHABDODES, nov.
Stepheoceratan, *niortensis*; Genotype, Holotype. Cf. CCXXXIX

Cardioceras cordatum
Field Farm, Worminghall, Bucks ; well-sinking in clay
Worminghall Rock, about 3 feet down ; S.B. Coll. 3572
S. 37, 38, 27, 29 ; 56, 47, 28·5, 23 ; ribs 21 (1), 42 (2), c. 90 (keel)
(EL, **O**), EL, **OV**, L1, **OV** ; L1 c. 50 at 12 mm. ; max. c. 60

MITICARDIOCERAS MITE, nov.
Cardioceratan, *mite* ; Genotype, Holotype

Fig. 2

Fig. 1

MORPHOCERAS POLYMORPHUM
Grange Quarry, Broad Windsor, Dorset ; I.O., top beds
S.B. Coll. 3371 ; S. 37·5, 45, 40, 21 ; 53, —, 32, —
S. 67, 36, 25·5, 31·5 ; max. c. 98. See CCCLI

PATEMORPHOCERAS MACRESCENS, nov.
Zigzagiceratan, *zigzag* ; Holotype

Fig. 1

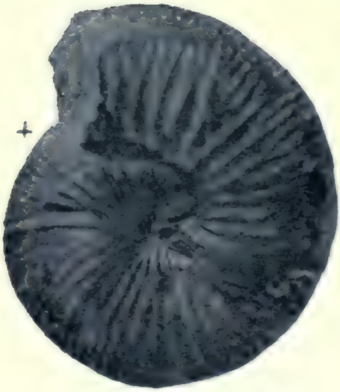
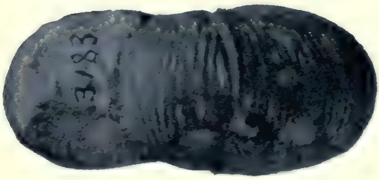


Fig. 3

Fig. 2



MORPHOCERAS DIMORPHUM ; S. BUCKMAN, 1910, cit. spec.
Q.J.G.S. LXVI, 73 ; "Burton Bradstock, Dorset ; 3rd Bed," § 11, 3
S.B., ex Darell, Coll. 3183 ; S. 30, 55, 70, 3
S. 50, 38, 41, 22 ; max. c. 55. Cf. CCCLXXVI

DIMORPHINITES DIMORPHUS, D'ORBIGNY SP.
Parkinsonian, *truellei* ; Genotype

Fig. 1

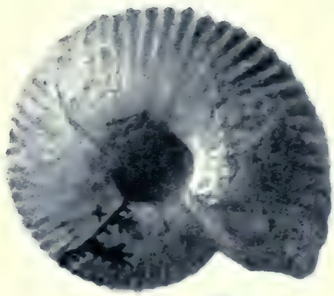
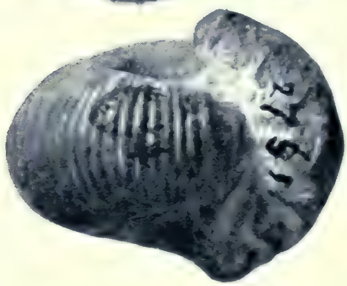


Fig. 2



" MACROCEPHALITES MORRISI "
" Sherborne, Dorset, [Dancing Hill, or Haydon] ; F. E. Rock "
Grey, hard, somewhat shelly stone ; S.B., ex J.B., Coll. 2761
S. 29, 43, 67, 31 ; 45, 44, 77, 22 ; max. c. 65

MORRISITES FORNICATUS, S. BUCKMAN, 1921, III, 48
Tulitan, *Morrisites* ; Holotype. See CCLXXIII

Fig. 3

Fig. 1a

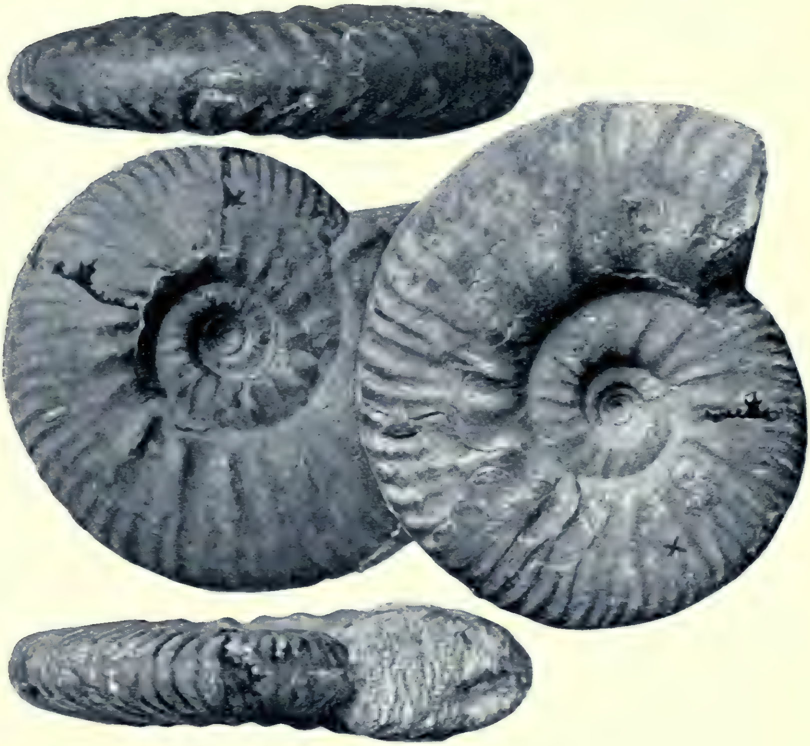


Fig. 1

Fig. 2

PROPLANULITES KOENIGI
[Kellaways, Wiltshire ; Kellaways Rock, d] ; J.W.T. Coll.
S. 45, 42, 29, 24·5 ; S. 71, 38, 26, 35 ; ribs 19
Max. c. 73 ; L1, 18 per cent. at 19 mm. wh.-breadth

PROPLANULITES EXCENTRICUS, S. BUCKMAN, 1921, III, 29
Proplanulitan, *opimus* ; Holotype. See CCCLX

Fig. 2
× 0·44

Fig. 1
× 0·55

Ammonites goliathus
Headington Quarry, Oxford, Magdalen College Pit
Corallian Limest., " Bottom Course, about 5″ above Sands," (workman)
Derived ex Littlemore Sands—L.C.G. matrix in air-chambers
S. 116, 49, 65, — ; 192, 56, 67, 11·5 ; size 219 ; max. c. 340

GOLIATHICERAS MICROTRYPA, nov.
Cardioceratan, *Goliathiceras* ; Holotype. See CCCXLIX

Fig. 1

Fig. 3

Fig. 2

" AMMONITES PECTINATUS "
" Swindon, [Wiltshire]. Da " = Upper Cemetery Beds, 12, p. 29
Geol. Surv. Engl. 45938, (Hudleston C.) ; EL, 43, L1, 38·5, L2, 23 at 23mm.
S. 33, 42·5, 35, 27 ; 73 ribs ; 64, 37·5, 29·5, 31 ; c. 97 ribs

PECTINATITES AULACOPHORUS, nov.
Paravirgatitan, *pectinatus* ; Holotype. See CCCLIV

Fig. 1

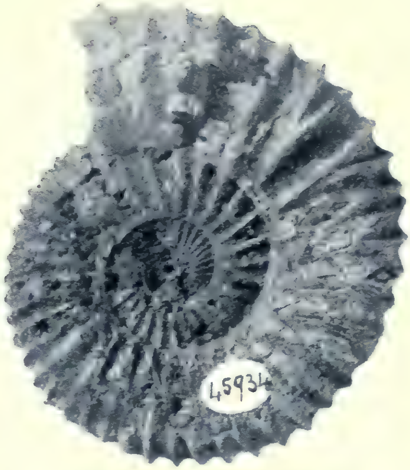
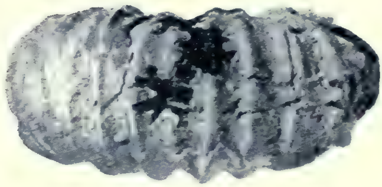
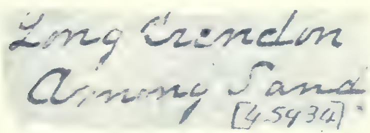


Fig. 2





"PERISPHINCTES PALLASIANUS"
Long Crendon, [Bucks], among Sand ; [Barrel Hill, Thame Sands]
Geol. Surv. E. 45934, Hudleston C. ; EL, 39, L1, 35, L2, 23 at 18·5 mm.
S. 35, 38, 37, 34 ; 60, 31·5, 38·5, 41·5 ; 25 ribs ; max. 105 +

PARAVIRGATITES DESIDERATUS. NOV.
Paravirgatitan, *paravirgatus* ; Holotype. See CCCVIII

Fig. 1 × 0·46 Fig. 2 N.S.

. . . PERISPHINCTES ROTUNDUS
Wheatley, Oxfordshire, Brickyard; Wheatley Sands, p. 28
S.B. Coll. 3799; EL, 56 ?, L1, 64, L2, 31 ? at 79 mm. wh.-breadth
S. 170, 37, 37, 36 ?; 251, 33, 36, 43; 315, 33, 33, 44; max. c. 450

WHEATLEYITES OPULENTUS, nov.
Paravirgatitan, *Wheatleyites*; Holotype. See CCCLXV

Fig. 1

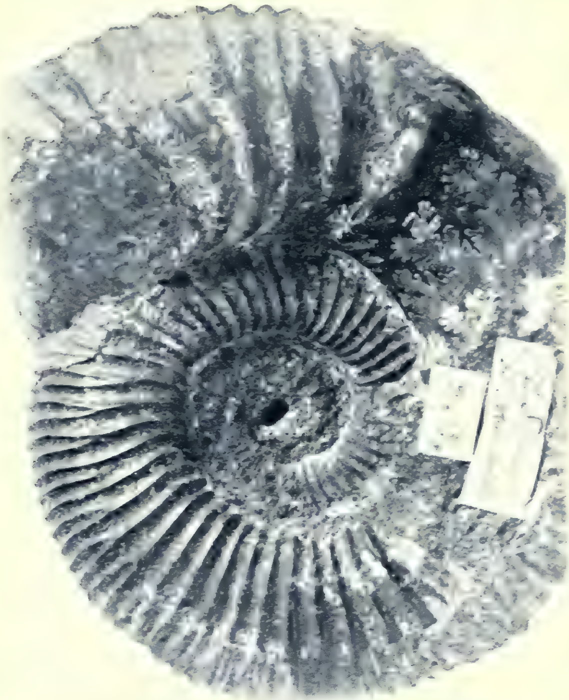
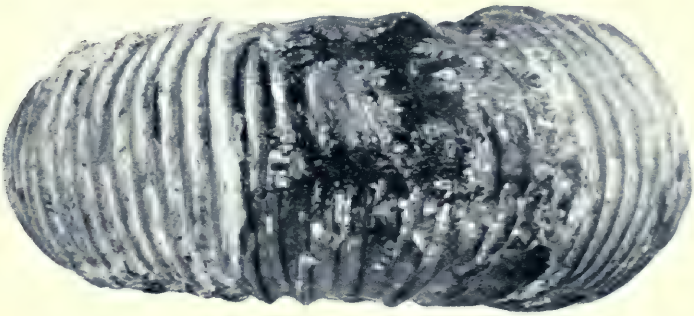


Fig. 2



"PERISPHINCTES ROTUNDUS"
"Swindon, [Wiltshire]; Portland Sands"; [Seq. III, 12, p. 29]
Geol. Surv. E. 45936, (Hudleston C.); EL, 66, L1, 60, L2, 38, at 26·5mm.
S. 57, 37, 43, 34; 96, 34·5, 44·5, 37·5; 38 ribs

WHEATLEYITES OPULENTUS, nov.
Paravirgatitan, *Wheatleyites*; Paratype. See CCCLXV

Fig. 1

× 0·53 Fig. 2

PERISPHINCTES ROTUNDUS
Wheatley, Oxfordshire, Brickyard; Wheatley Sands, p. 28
S.B. Coll. 3798; EL, 30·5, L1, 37, L2, 24 at 89 mm. whorl-breadth
S. 178, 30, 35 ? 44; 231, 31, 33·5, 45; 275, 33, 30, 45; max. c. 470

WHEATLEYITES REDUCTUS, nov.
Paravirgatitan, *Wheatleyites*; Holotype. See CCCLXXXIII

× 0·33

AMMONITES PSEUDOGIGAS, BLAKE
(1880, Q.J.G.S. XXXVI, 192, 225, 228) ; Barrel Hill, Long Crendon, Bucks
S.B. Coll. 3055 ; ribs, 25 on penult., 39 on last whorl
S. 215, 32, 48, 43 ; 356, 32, 42, 43 ; complete with mouth

TROPHONITES PSEUDOGIGAS, BLAKE sp.
Gigantitan, *Trophonites* ; Chorotype. See CCCXLIII

× 0·43

AMMONITES PSEUDOGIGAS, BLAKE
Portland Rocks, Creamy Limestones, [Soft Rock, T.A. IV, Tab. II, 6, p. 26]
S.B. Coll. 3055. Blake cites sp. from 4 horizons, p. 225 ; (3 Ages, Tab. II)
Creamy Limestones, Bucks, one of his horizons. Blake's types lost

TROPHONITES PSEUDOGIGAS, BLAKE SP.
Gigantitan, *Trophonites* ; Chorotype. See CCCXLIII

Fig. 2
× 0·5

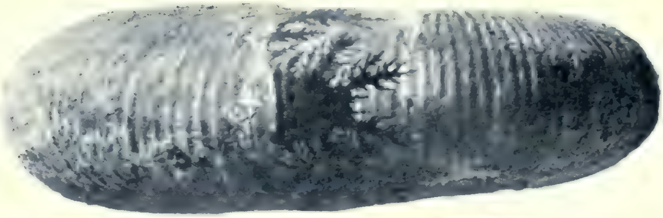


Fig. 1
× 0·71

Perisphinctes moorei
Bradford Abbas (Railway Cutting), Dorset ; I.O. *truellii*
S.B. Coll. 2120 ; ribs 51 to c. 59 ; 50 to c. 100 ; 54 to 175 mm.
S. 107, 36, 33, 34 ; 175 38, 30, 38 ; max. c. 250

PHANEROSPHINCTES COSTULATOSUS, nov.
Parkinsonian, *truellei* ; Holotype. See CCXI

Fig. 2
N.S.

Fig. 1a
N.S

Fig. 1
× 0·72

SONNINIA ARENATA; S. BUCKMAN, 1893, cit. spec.
Q.J.G.S. XLIX, 494; [Sandford Lane], "near Sherborne, Dorset"
Foss. Bed, lower part]; S.B., ex Darell, Coll. 1024; S. 102, 42, 27, 27
S. 202, 35·5, 26, 33; (267, —, —, 41; 316, —, —, 48); max. c. 320

FISSILOBICERAS PHLYCTÆNODES, NOV.
Sonninian, *fissilobata*; Holotype. See CLXXXI

Fig. 1

Fig. 2

Fig. 2a

Fig. 1a

AMMONITES CONCAVUS
Bradford Abbas, Dorset ; I.O., Fossil Bed, mid. part ; S.B. Coll. 3770
S. 38. 51, 25. 10·5 ; 71, 48. 21. 15·5 ; max. c. 95

GRAPHOCERAS SCRIPTITATUM, NOV.
Sonninian, *stigmosum* ; Holotype. Cf. CX

AMMONITES STUTCHBURII

N. Bank of R. Brora, $\frac{1}{2}$-m. W. of Coal Pit ; Fascally, Brora, Sutherl.
Dark sandy shales (Fascally Shales) ; Geol. Surv. Scotl., *M* 308 *g*
S. 87, 43, —, 26 ; 125, 43, — 27 ; ribs 35 (1), 152 (2) ; max. c. 160
Poor in tuberculation ; ribs strong over venter without tubercles

ZUGOKOSMOKERAS ZUGIUM, NOV.

Kosmoceratan, *zugium* ; Genotype, Holotype. See CXCIV

Anaptychus

Psiloceras planorbis
Aird nah Iolaire, The Wilderness, Ardmeanach, Mull, Scotland
Lower Lias, dark shales, Bed 13 up; Geol. Surv. Scotland, *M* 3328 *f* [a]
Umbil. at 32·5, 41, at 43 and 57, 43·5; s, 76, 30, —, 44·5

PSILOCERAS ÆQUABILE, nov.
Caloceratan, *æquabile*; Holotype. See CCXXIII

× 0·52

Fig 1a

Fig. 1

AMMONITES CORNUCOPIA, YOUNG & BIRD, 1822, "Type"
Geol. Yorks., 252, 327 ; XII, 6 ; Whitby, Yorkshire ; Alum Shale
[Peak Shales] ; Whitby Mus. No. 82 ; S. 47, 40, 54, 32
S. 128, 39, 48, 33·5 ; 304, 35, 35, 39 ; max. c. 310, → *Orbiculoidea*
"Aperture nearly circular," p. 252. Y. & B.'s fig. a synthetograph ?

THYSANOCERAS CORNUCOPIA, YOUNG & BIRD sp.
Haugian, *variabilis* ; Holotype ? Lectotype. Cf. CXXX

× 0·75

LYTOCERAS 'SUBLINEATUM', S. BUCKMAN, 1888, cit. spec.
North Nibley Knoll, Gloucestershire ; Cotteswold Sands, *variabilis*
S.B. Coll. 391 ; S. 60, 42, 60, 31 ; 139, 39·5, 49, 34
S. 170, 39, 39, 36 ; max. c. 185. Fimbriæ begin c. 25 mm. diam.

THYSANOCERAS CORNUCOPIA, YOUNG & BIRD SP.
Haugian, *variabilis*

Fig. 1 × 0·94

Fig 2 N.S

LYTOCERAS SUBLINEATUM ; S. BUCKMAN, 1888, cit. spec.
Mon. I. O. Amm., 46, § VII, 30 ; Q.J.G.S. 1889, XLV, 445, § III, 30
North Nibley Knoll, Gloucestershire ; S. 139, 39·5, 49, 34
Part of outer whorl removed to show suture-line

THYSANOCERAS CORNUCOPIA, YOUNG & BIRD SP.
Haugian, *variabilis*

Copy of Protograph

AMMONITES BISULCATA, BRUGUIÈRE, 1789, Holotype
Ency. Méth., Vers I, 28, (protol.), citing Lister, 1678 [Anim.] Angl. VI, 3 (Protograph) as "icon. bona"; [Northants]. Bugthorp [= Bugbrook ?] Byland [= Byfield ?]; F. 41, 31, —, 43; ribs 29; specimen reduced ?

PALTOPLEUROCERAS BISULCATUM, BRUGUÈIRE SP.
Amaltheian, *spinatum*; Holotype

Copy of Protograph

PLANULITES SULCATA, LAMARCK, 1801, Holotype
Syst. Anim. sans Vert. 101, (protolog), citing Bourget, 1742,
Pétrif., XLVI, 290, (protograph) ; F. 64, 28, —, 52

PLANULITES SULCATUS, LAMARCK sp.
Hildoceratan, *bifrons* ? ; Genotype. Cf. CXIV and CCLXVII

PHLYSEOGRAMMOCERAS DISPANSUM; S. BUCKMAN, 1901, cit. spec.
Jur. Time-Table; Proc. Cottesw. XII, 266 (*Phylseogrammoceras*, misprint)
Little Sodbury, Glos, (Q.J.G.S. XLV, 1889, 446, IV, 6, ironshot marl)
S.B. Coll. 3767; S. 33, 45, 21, 24; 64, 41, 18, 29; 28 bullate ribs

PHLYSEOGRAMMOCERAS ELECTUM, NOV.
Grammoceratan, *dispansum*; Genolectotype, Holotype. See CCCXL

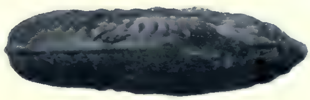
Schlotheimia angulata ; Bayle, 1878, Genotype
Géol. France, lxv, 1 ; " Mœhringen, près Stuttgart (Wurtemberg)
" Infralias " ; F. 91, 38, —, 31 ; 157, 36, —, 36 ; max. 330 +
Cf. *S. intermedia*, Pompeckj, type, Quenstedt, Amm. Schwäb. J. iv, 1

SCHLOTHEIMIA PRINCEPS, nov.
Caloceratan, *angulata*. See XXXVIII

Fig. 1
× 1·3

Fig. 1a
× 1·3

Fig. 2
N.S.



PŒCILOMORPHUS INFERNENSIS, ROMAN
(1913 Ann. Soc. Linn. Lyon, LX, 19; IV, 10 [holotype] "adulte"
1921, Crusol, VI, 29); Bradford Abbas, Ry.; Foss. Bed, [middle part]
S. B. Coll. 3837; S. 22, 41, 34, 28; 38, 42, 30, 26; ribs 26; size 40

EUAPTETOCERAS INFERNENSE, ROMAN sp.
Sonninian, *Eudmetoceras*. See CCXCIX

Fig. 1

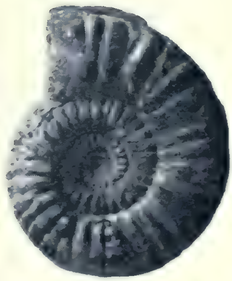


Fig. 2

Pœcilomorphus infernensis, Roman
(1913, Ann. Soc. Linn. Lyon, LX, 19 ; IV, 8 ; 1921, Crusol, VI, 3)
Bradford Abbas, Dorset ; Foss. Bed [middle] ; S. B. Coll. 3334
S. 21, 32, 49, 42 ; 37, 34, 39, 40 ; ribs 25

EUDMETOCERAS PROSPHUES, nov.
Sonninian, *Eudmetoceras* ; Holotype. See CLXXIX

AMMONITES PINGUIS, ROEMER
" Clatcomb, Sherborne, Dorset ; I.O." [Cf. Q.J.G.S. XLIX, 498, § XIV, 5]
S.B., ex Darell, Coll. 1084 ; S. 65, 39, 38·5, 31
S. 115, 35, 32, 37 ; max. c. 120. (*Sonninia nodatipinguis*, MS.)

STIPHROMORPHITES NODATIPINGUIS, NOV.
Sonninian, *mollis* ; Genotype, Holotype. Cf. CCCXLI

Fig. 1

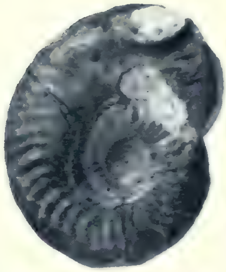


Fig. 2

Fig. 1a
× 1·28

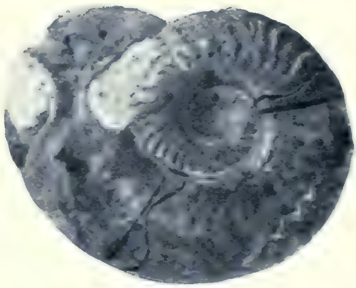
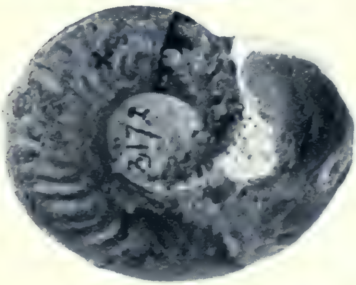


Fig. 1b
× 1·28



SONNINIA ZURCHERI ; S. BUCKMAN, 1896, cit. spec.
Q.J.G.S. LII, 692, § x, 3–4, 699 ; Rackledown, Dundry, Somerset
Upper/Lower White Ironshot ; S.B. Coll. 3172, pres. J. W. D. Marshall
S. 18·5, 43, 48, 28 ; 36, 39, 31, 33. No coronate stage
(Douvillé, 1885, B. S. G. Fr. (3) XIII, 1, 6, lectotype of *S. zurcheri*)

PELEKODITES PELEKUS, NOV.
Sonninian, *Shirbiurnia* ; Genotype, Holotype. Cf. CCXLI

Fig. 1a

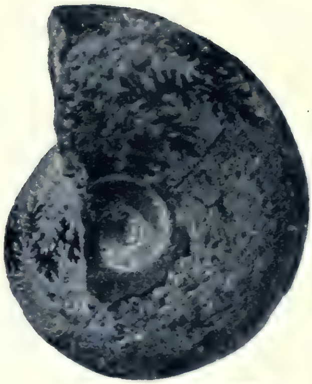
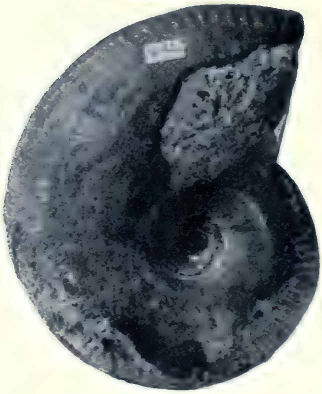


Fig. 1



LISSOCERAS OOLITHICUM
[Sandford Lane] " near Sherborne, Dorset " ; [Fossil Bed, middle part]
(Q.J.G.S. XLIX, 1893, 493, 494) ; S.B., ex Darell, Coll. 932
S. 24, 48, 36, 21 ; 51, 46·5, 31, 23 ; max. 77 +

LISSOCERAS SEMICOSTULATUM, NOV.
Sonninian, *mollis* ; Holotype. Cf. CCCIII

Fig. 2

Fig. 1

Venter of 3839*b*
Pl. CDII B

PERISPHINCTES GOREI
Long Crendon, (N.W.) ; heap of Beds 2, 3, [by matrix 3, Tab. II, 14]
Hard, shelly, slightly glauconitic ; S. B. Coll. 3839 *a*
S. 87, 27·5, 30, — ; 122, 24, 24, 57 ; ribs c. 39 ; max. 122
EL, 45 ?, L1, 46, L2, 37 at 24 mm. whorl-breadth

CRENDONITES LEPTOLOBATUS, NOV.
Behemothan, *leptolobatus* ; Genotype, Holotype. Cf. CCCLIII

Fig. 1a

Fig. 2a

Fig. 1

Fig. 2
× 0·83

AMMONITES BIPLEX
Oakley, heap of stones, [ex Brill], Bucks ; hard, shelly, slightly glauconitic Portl. Stone (=Tab. II, 14] ; S.B. Coll. 3221, pres. Mr. James Kirby
S. 90, 40, 25, 30 ; 119, 30, 25, 38
Ribs c. 28 on flat side, bifurcate on edge of flat venter

SIMOTOICHITES SIMUS, NOV.
Behemothan, *leptolobatus* ; Genotype, Holotype. Cf. CCCLIII B

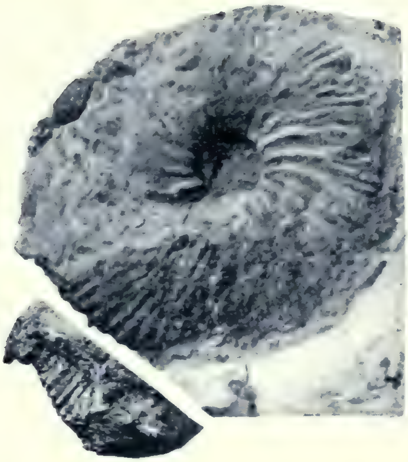


Fig. 2
N.S.

Fig. 1
× 1·7

AMMONITES VIRGATUS
Long Crendon (N.W.), Bucks, in mouth of 3839*a*, Pl. CDI
S.B. Coll. 3839*b*; S. 16·5, 46, 24? 24; 29, 48, 24, 20
Ribs c. 23, mostly triplicate or perhaps more divided

SIMOTOICHITES SIMUS, NOV.
Behemothan, *leptolobatus*; Paratype

Fig. 1 × 0·74 Fig. 2 × 0·72

AMMONITES BOLONIENSIS
Long Crendon (Barrel Hill), Bucks ; " Osses Ed " (workmen)
[Base of Upper Witchett, Tab II, 1], white, chalky, with *Trigonia*
S.B. Coll. 2050, purch. ; S. 118, 30, 44, 37 : 183, 32, 37, 44
Ribs 25 ; size 203 ; max. c. 205 ; EL, 30, L1, 31, L2, 15, at 46 mm.

GLOTTOPTYCHINITES GLOTTODES, NOV.
Gigantitan, *glottodes* ; Genotype, Holotype. Cf. CCCLV

"AMMONITES GOWERIANUS"
"Coal Pit, Brora, Sutherland, Scotland; Roof Bed"
T.A. IV, 41, Seq. IX, 29; Geol. Survey, Scotland, *M* 1659*g*
S. 48, 43, 51, (29?); 72, 40, 45, 30; max. c. 83

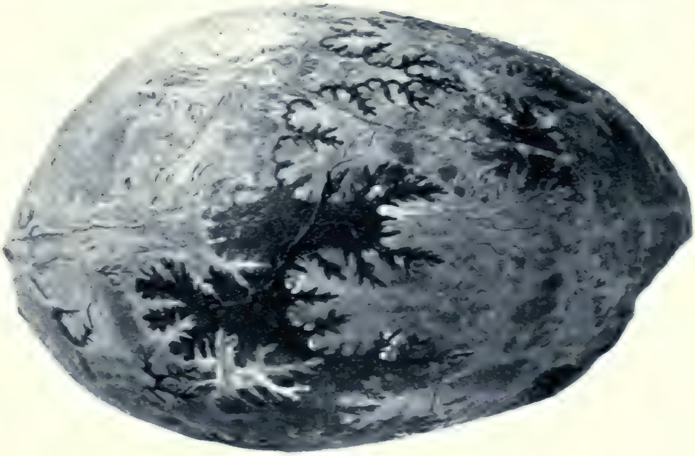
GOWERICERAS CHILDANUM, NOV.
Proplanulitan, *majesticus*; Holotype. See CCLXXXVIII

× 0·84

Fig. 1

×

Fig. 2



QUENSTEDTICERAS SUTHERLANDIÆ ; MORLEY DAVIES, 1916, cit. spec.
Geol. Mag. (6) III, 397 ; " Ludgarshall, Bucks ; Oxford Clay
" Stone-bed in *renggeri* clay " ; A. Morley Davies Coll.
S. 86, —, 64, — ; 102, 40, 66. 23·5 ; size 110 ; max. c. 145

EBORACICERAS CADIFORME, NOV.
Vertumniceratan, *ordinarium* ; Holotype. See CLXXII

× 0·96

Fig. 2

Fig. 1

AMMONITES MODIOLARIS
From a cottage, Eype, Bridport, Dorset, [Chippenham, Wilts]
[Kell. Clay, (a)], light blue clay; S.B. Coll. 3435, purch.
S. 74, 45, 76, 23·5 : 66, 40·5, 91, 25·5 ; max. c. 100

CADOCERAS TOLYPE, nov.
Proplanulitan, *majesticus* ; Holotype. See CCLXXV

Fig. 1
× 0·55

Fig. 2

AMMONITES JAMESONI ANGUSTA
Am. frischmanni, Quen. ; Branch Huish, Radstock, Somerset
Middle Lias, *jamesoni* beds ; S.B. Coll. 2042
S. 178, 25, 16, 54 ; 270, 21·5, 16, 64 ; max. c. 275

JAMESONITES RETICULATUS, nov.
Polymorphitan, *Phricodoceras* ; Genotype, Holotype. Cf. XCII

Fig. 2a Fig. 1 Fig. 2

AMMONITES HAWSKERENSIS, YOUNG & BIRD, 1828, Paratype
Geol. Yorks, p. 258, 259; Hawsker shore, Yorkshire
[Lias lands, p. 359]; Whitby Museum, No. 269
S. 89, 36, 27·5, 38; 137, 33, 25·5, 39; ribs 29; max. c. 147

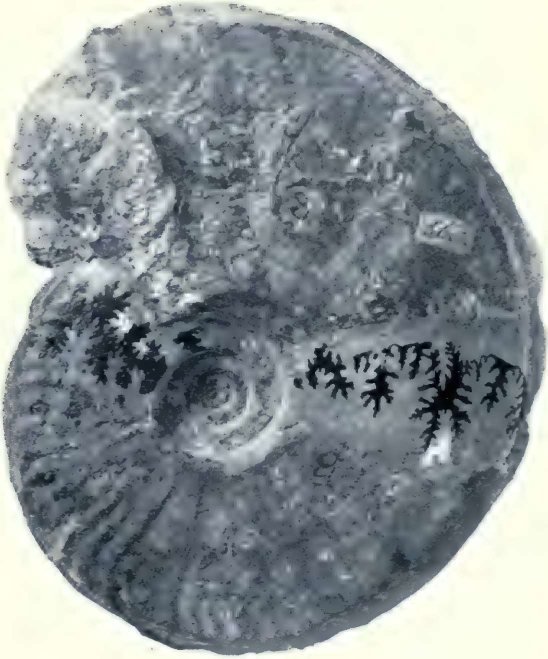
PALTOPLEUROCERAS HAWSKERENSE, YOUNG & BIRD SP.
Amaltheian, *hawskerense*. See CCCXCII

Fig. 2

Fig. 1

AMMONITES MURCHISONÆ
[East Coker, Somerset]; Inf. Ool.; J. W. T. Coll.
S. 38·5, 36, 28·5, 34; 75, 44, 24, 29·5; max. c. 120 +

MANSELIA AUSTERA, nov.
Ludwigian, *murchisonæ*; Holotype. Cf. CCCLXXXVIII



AMMONITES LÆVIUSCULUS; J. BUCKMAN, 1844, cit. spec. Geol. Chelt. pp. 27, 90; *Witchellia*, S.B., Q.J.G.S. LI, 1895, 411, 418, 419 § XXIV, [3]; "Cold Comfort," Cheltenham, Glos; *Perna* Bed S.B., ex J.B., Coll. 665; S. 49, 45, 23, 23; 93, 48, 21·5, 21·5; max. c. 140

WITCHELLIA PATEFACTOR, NOV.
Sonninian, *Witchellia*; Holotype. See CLXVIII

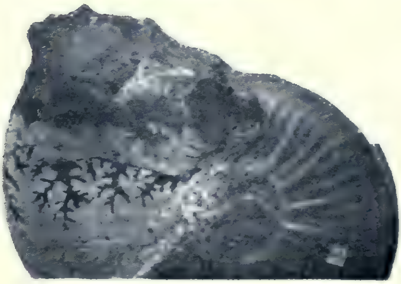
× 0·52

AMMONITES ADICRUS
[Sandford Lane], " near Sherborne, Dorset ; Inf. Ool."
[Fossil Bed, (lower) middle part] ; S.B., ex Darell, Coll. 1000
S. 149, 37, 36·5 (30), 30·5 ; 203, 34, 30 (25), 40·5 ; max. c. 300

SHERBORNITES PROJECTIFER, nov.
Sonninian, *Shirbuirnia* ; Genotype, Holotype. Cf. CCV

Fig. 1

Fig. 1a



Ammonites corrugatus ; S. Buckman, 1889, cit. spec.
Geol. Mag. (3) VI, 202 ; *Sonninia*, Id. ; Dundry, Somerset
Inferior Oolite, Ironshot Bed ; S.B. Coll. 3914
S. 30, 43·5, 30, 23·5 : 57, 45·5, 25·5, 24

SONNINIA CORRUGATA, J. de C. Sowerby sp., 1824
Sonninian, *sauzei* ; Topotype. See CCXCVIII

×1·8

Fig. 1

Fig. 1a

Fig. 2

Dactylioceras crassum ; S. Buckman, 1889, cit. spec.
Q.J.G.S., XLV, 445, § iii, 28 or 30 [28] ; *Stephanoceras*, S.B. 1888
Mon. I.O. Amm., 46, § vii ; " North Nibley, Glos ; *variabilis* beds "
S.B. Coll. 3832 ; S. 14, 43, 66, 30 ; 25, 34, 44, 40 ; ribs 27 ; max. 25

CATACŒLOCERAS CONFECTUM, nov.
Haugian, *variabilis* (*grandis*) ; Genotype, Holotype. Cf. CXIX

Fig. 1

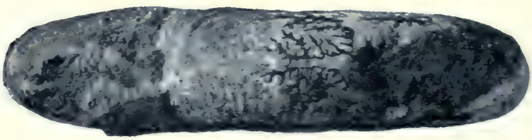


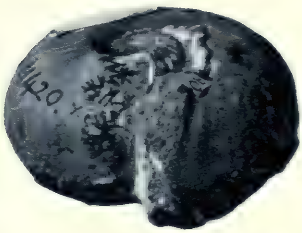
Fig. 2

AMMONITES POLYMERUS
[Sandford Lane], "near Sherborne, Dorset; Inferior Oolite" [Fossil Bed, lower part]; S.B., ex Darell, Coll. 1122
S. 45·5. 37, 35. 33; 75, 29, 24. 42·5.; max c. 120

EMILEIA CATAMORPHA, nov.
Sonninian, *Shirbuirnia*; Holotype. See CLXIV

Fig. 1

Fig. 2



SPHÆROCERAS WRIGHTI, S. BUCKMAN, 1881, Holotype
Q.J.G.S., XXXVII, 599 ; Frogden Quarry, " Oborne, Dorset
" *Humphriesianum* zone " ; Manchester Mus. (S.B. Coll.) L11420
S. 28, 48, 75, 17·5 ; 45, 34, 43, 31 ; max. 46

CHONDROCERAS WRIGHTI, S. BUCKMAN SP.
Stepheoceratan, *Epalxites*. See CCCLVII

× 0·85

AMMONITES PROCERUS
Burton Bradstock, Dorset [Allotment Quarry; 1st Bed]
S.B. Coll. 3425, purchased from workmen
S. 104, 35, 33, 40; 162, 35, 29, 39; size 175; max. c. 310

PROCERITES TMETOLOBUS, NOV.
Zigzagiceratan, *zigzag*; Holotype. See CLIII

Fig. 1

Fig. 1a

Fig. 2a

Fig. 2

AMMONITES GULIELMI
" South Cave, Yorkshire ; Kellaways Rock," siliceous, ironshot
Mr. Frank Petch Coll. ; S. 27. 40, 25, 27·5 ; 54. 39. 33. 31·5
Max. c. 58 ; venter runcinate, feebly bordered, no round stage

CATASIGALOCERAS PLANICERCLUS, nov.
Macrocephalitan, *Catacephalites* ; Genotype, Holotype. Cf. CXCIV

Fig. 2b

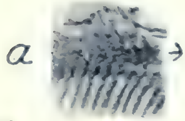
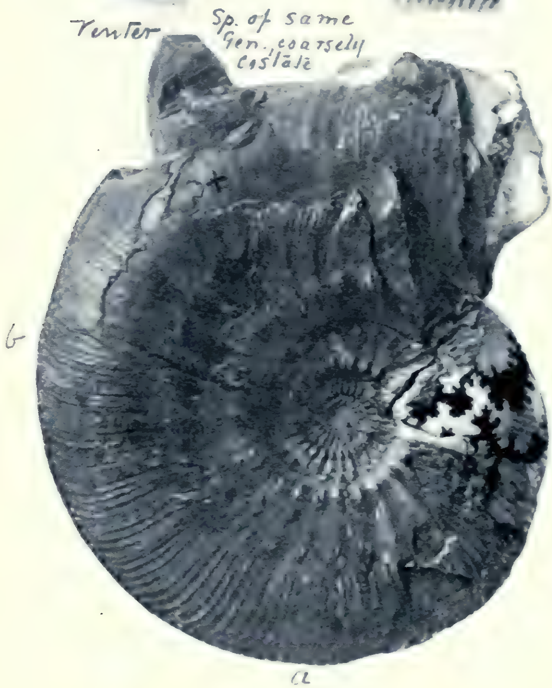


Fig. 2a

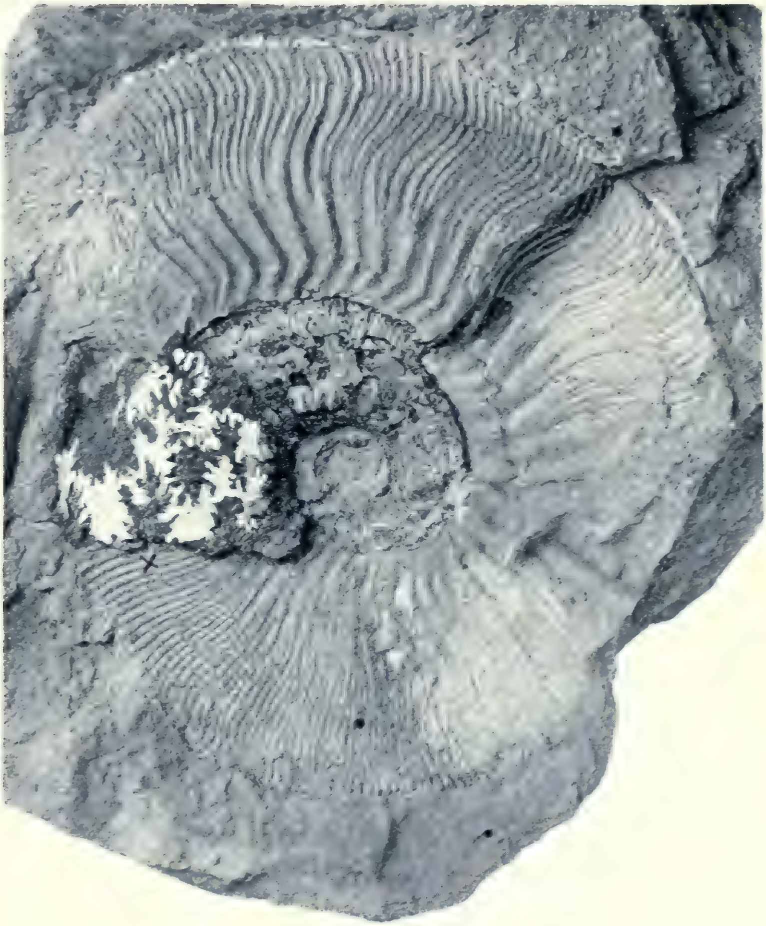
Fig. 1



AMMONITES JASON
"Backwater, Weymouth, Dorset; Oxford Clay"
Geological Survey of England Coll., No. 30505
S. 43, 43, 21·5, 23·5; 72, 46, 18·5, 24; size 81; max. c. 104

GULIELMITES CONLAXATUM, NOV.
Kosmoceratan, *conlaxatum*; Genotype, Holotype. Cf. CDXVII

× 0·73



COSMOCERAS JASON
C. grossouvrei, R. Douvillé, 1915, XII, 1 (not 2, 3)
Coal Pit, Fascally, Brora, Sutherl. ; dark, sandy sh., Fascally Shales
Geol. Surv. Scotl. *M* 385g ; S. 78, 49, —, 20·5 ; 113, 40, —, 24
S. 146, 32·5, —, 33·5 ? ; ribs c. 40 (1) ; c. 200 (2) ; max. c. 155

ZUGOKOSMOKERAS INTERPOSITUM, nov.
Kosmoceratan, *zugium* ; Holotype. See CCCLXXXIX

Fig. 3 Fig. 1

Fig. 1a

Fig. 4

Fig. 2

Fig. 5

CARDIOCERAS CORDATUM
Cowley, Oxfordshire (near Industrial School); Lower Calcareous Grit
S.B. Coll. 2771, purch.: S. 17·5, 36, 34, 32; 32, 40, 35, 33
S. 48, 40, 36, 32; 61, 40, 35, 31; max. c. 65

ANACARDIOCERAS CORDATIFORME, NOV.
Cardioceratan; *cordatiforme*; Genotype, Holotype. Cf. CCCLXXV

Fig. 2

Fig. 1

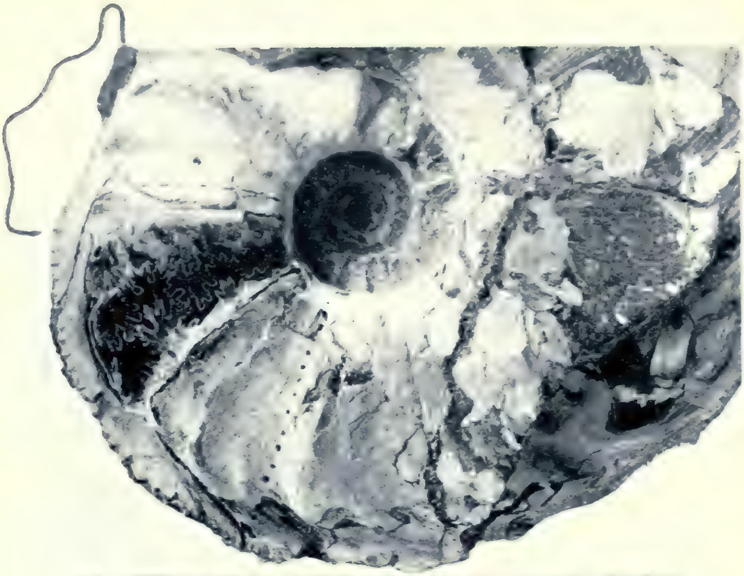
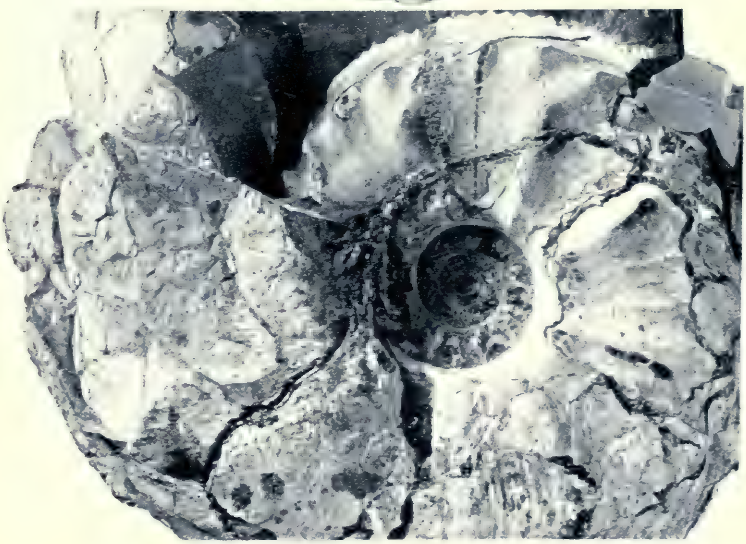


Fig. 1a



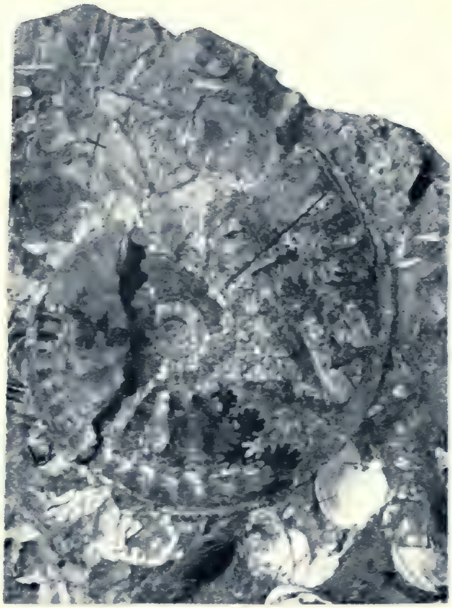
AMMONITES SERRATUS
" On shore, Port an Righ, Balintore, Ross, Scotland
Kimmeridge Clay " ; Geol. Survey Scotland, *M* 3296*g*
S. 68, 46, 35·5, 23·5 ; 100, 48, c. 34, 22 ; max. c. 117 with part mouth

PRIONODOCERAS OGIVALE, NOV.
Prionodoceratan, *prionodes* ; Holotype. See CLV

Fig. 1b

× 1·8

Fig. 1



× 1·1

Fig. 1a

× 1·8

Ammonites superstes
Rid's Hill Brickworks, Brill, Bucks; Kimmeridge Clay
Serpulite Bed; S.B. Coll. 3899; S. 13, 42, 23, 24
S. 29, 42, 24, 26; 50, 42, 25, 27; size 54; max. c. 72

PRIONODOCERAS SUPERSTES, Phillips sp., 1871
Prionodoceratan, *superstes*. See CDXX